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A PRELIMINARY LOOK AT AVE-SESAME III CONDUCTED ON
APRIL 25-26, 1979

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and Robert E. Turner

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16. ABSTRACT This report contains information on data collected, synoptic conditions, and severe and unusual weather reported during the AVE-SESAME III period. The information presented is preliminary. The purpose of the report is to provide to researchers a preliminary look at conditions during the AVE-SESAME III period.			
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A PRELIMINARY LOOK AT AVE-SESAME III CONDUCTED

ON 25-26 APRIL 1979

1. OBJECTIVES AND SCOPE

The objectives of AVE-SESAME (Atmospheric Variability Experiment - Severe Environmental Storms and Mesoscale Experiment) are to provide a data base for studying mesosynoptic atmospheric structure and variability associated with severe storms. Rawinsonde sounding data at 3-h intervals are gathered to investigate spatial and temporal changes of mesosynoptic conditions associated with the formation, development, maintenance, and interrelationships between convective activity and its immediate environment. Through such a study it is hoped that a better understanding of convective activity and associated severe weather outbreaks will be achieved.

AVE-SESAME III, the third in a series of six such experiments, was conducted on 25-26 April 1979. This quick-look report contains information on the general weather conditions during the AVE-SESAME III period and includes synoptic maps, radar reports, satellite photographs, precipitation areas and amounts, and a summary of severe weather reports assembled from the NOAA weather wire and the national weather summaries. The purpose of this report is to provide to researchers a preliminary look at conditions during the AVE-SESAME III period. Additional information has been presented by Alberty et al., (1979).

2. DATA COLLECTED

a. Rawinsonde soundings

Rawinsonde soundings were collected at 23 National Weather Service stations and at 19 special stations. A list of these stations is given in Table 1, and their locations are shown in Fig. 1. The dates and

Table 1. Rawinsonde stations participating in AVE-SESAME III experiment.

Station Number	Location
<u>NWS Stations</u>	
229 (CKL)	Centerville, Al.
232 (BVE)	Boothville, La.
235 (JAN)	Jackson, Ms.
240 (LCH)	Lake Charles, La.
247 (GGG)	Longview, Tx.
255 (VCT)	Victoria, Tx.
260 (SEP)	Stephenville, Tx.
261 (DRT)	Del Rio, Tx.
265 (MAF)	Midland, Tx.
270 (ELP)	El Paso, Tx.
327 (BNA)	Nashville, Tn.
340 (LIT)	Little Rock, Ar.
349 (UMN)	Monett, Mo.
354 (OCK)	Oklahoma City, Ok.
363 (AMA)	Amarillo, Tx.
365 (ABQ)	Albuquerque, Nm.
433 (SLC)	Salem, Il.
451 (DDC)	Dodge City, Ks.
456 (TOP)	Topeka, Ks.
469 (DEN)	Denver, Co.
532 (PIA)	Peoria, Il.
553 (OMA)	Omaha, Ne.
562 (LBF)	North Platte, Ne.
<u>Special Stations</u>	
001 (ABI)	Abilene, Tx.
002 (BVO)	Bartlesville, Ok.
003 (COU)	Columbia, Mo.
004 (CDS)	Childress, Tx.
005 (CLL)	College Station, Tx.
006 (CNK)	Concordia, Ks.
007 (DUA)	Durant, Ok.
008 (FSM)	Fort Smith, Ar.
009 (GAG)	Gage, Ok.
010 (GLD)	Goodland, Ks.
011 (ICT)	Wichita, Ks.
012 (JCT)	Junction, Tx.
013 (MLU)	Monroe, La.
014 (MRF)	Marfa, Tx.
015 (MTX)	Morton, Tx.
016 (OTM)	Ottumwa, Ia.
017 (POF)	Poplar Bluff, Mo.
018 (RTN)	Raton, Nm.
019 (UOX)	Oxford, Ms.

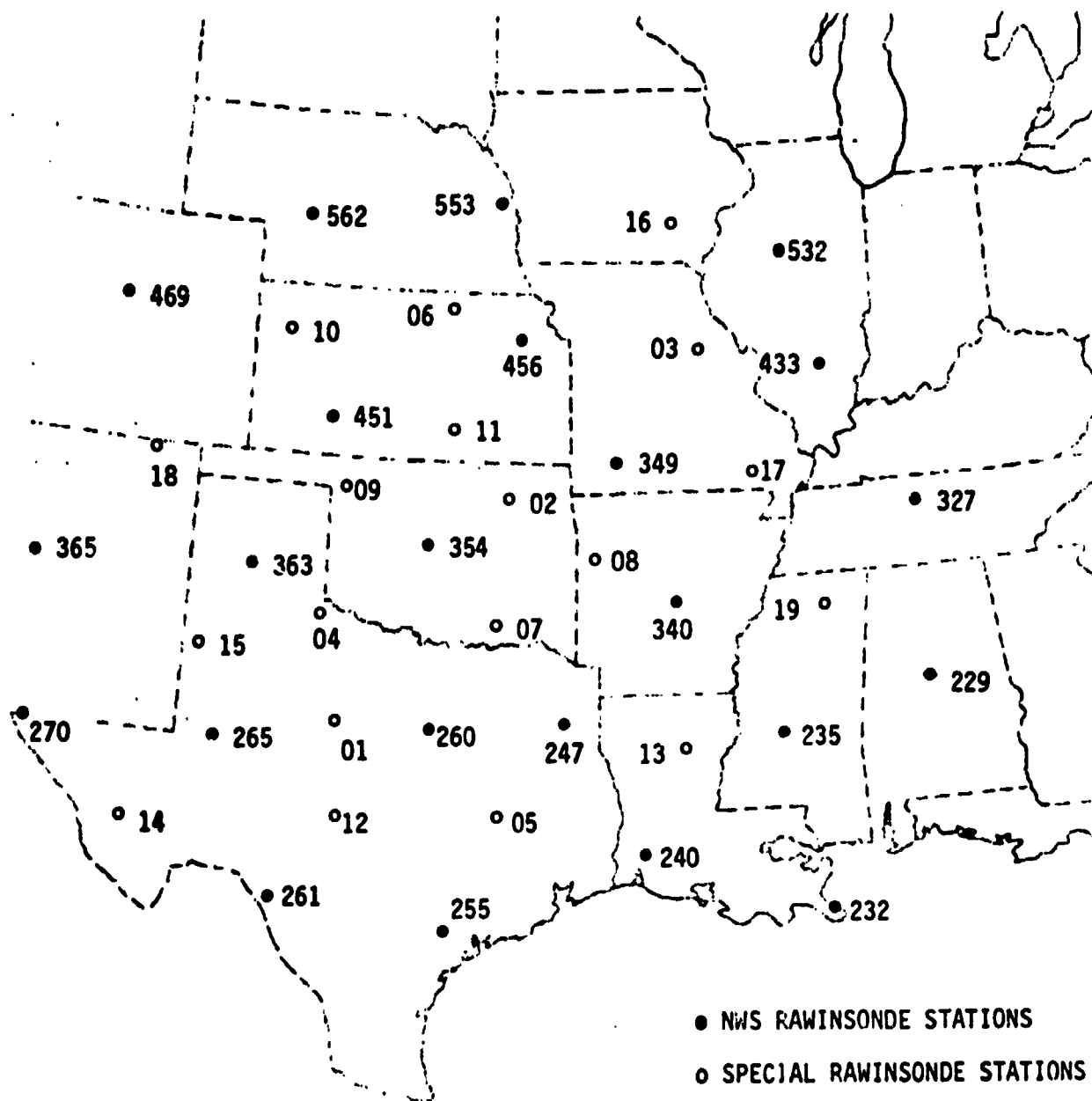


Fig. 1. Locations of rawinsonde stations participating in the AVE-SESAME III experiment.

times of scheduled soundings are as follows:

<u>Date</u>	<u>Time (GMT)</u>
25 April 1979	12, 15, 18, 21
26 April 1979	00, 03, 06, 09, 12

Sounding data interpolated to 25-mb intervals will be presented in a separate document that is under preparation. These data may be obtained in hard copy form or on magnetic tape from the Atmospheric Sciences Division, Space Sciences Laboratory, NASA, Marshall Space Flight Center, Alabama 35812.

b. Surface and Upper Air

Surface and upper air charts and data are available from the National Climatic Center in Asheville, North Carolina.

3. SYNOPTIC CONDITIONS

a. Synoptic Charts

Surface and upper air charts for the AVE-SESAME III period are presented in Figs. 2-6. Surface charts are presented at 6-h intervals and upper air charts at 12-h intervals. These charts were plotted and analyzed using National Weather Service data only, and show the general conditions during the experiment and should not be used for other purposes.

Synoptic conditions for 1200 GMT 25 April 1979 show a front oriented northeast-southwest through a low pressure cell situated over Kansas and Oklahoma. A relatively weak but slowly intensifying short wave indicated in upper air charts was located over the Texas panhandle and moving eastward. The system had good potential for the development of severe weather although limited moisture was available due to

an older, slower moving system in the Eastern Gulf of Mexico impeding the circulation of moisture northward to the newer system. However, a substantial quantity of moisture existed in a shallow layer near the ground.

By 1800 GMT 25 April 1979 the cold front advanced eastward into Missouri and Illinois, and southward into Texas and Oklahoma. Thunderstorms formed in Western Missouri and Northeastern Oklahoma during the time of maximum surface heating and as the short wave overtook the cold front. The rapidly moving cold front pushed southeastward into South Texas, Eastern Arkansas, Missouri, and Illinois. All severe weather associated with this system developed along the northern portion of the front where the slope of the front remained steep and ample moisture was available. In South Texas, New Mexico, and Arkansas, the cold front resembled a dry line with no convective activity due to a lack of moisture and the moderate slope of the front.

b. Radar

Selected radar summary charts are presented in Figs. 7-19 for the AVE-SESAME III period. These charts show areas of convective activity, heights of echoes, movement vectors, severe weather watch boxes, etc.

c. Satellite

Satellite photographs were taken at 15-min intervals during the AVE-SESAME III period. Selected visual or infrared satellite photographs for each hour during the period are presented in Figs. 20-43.

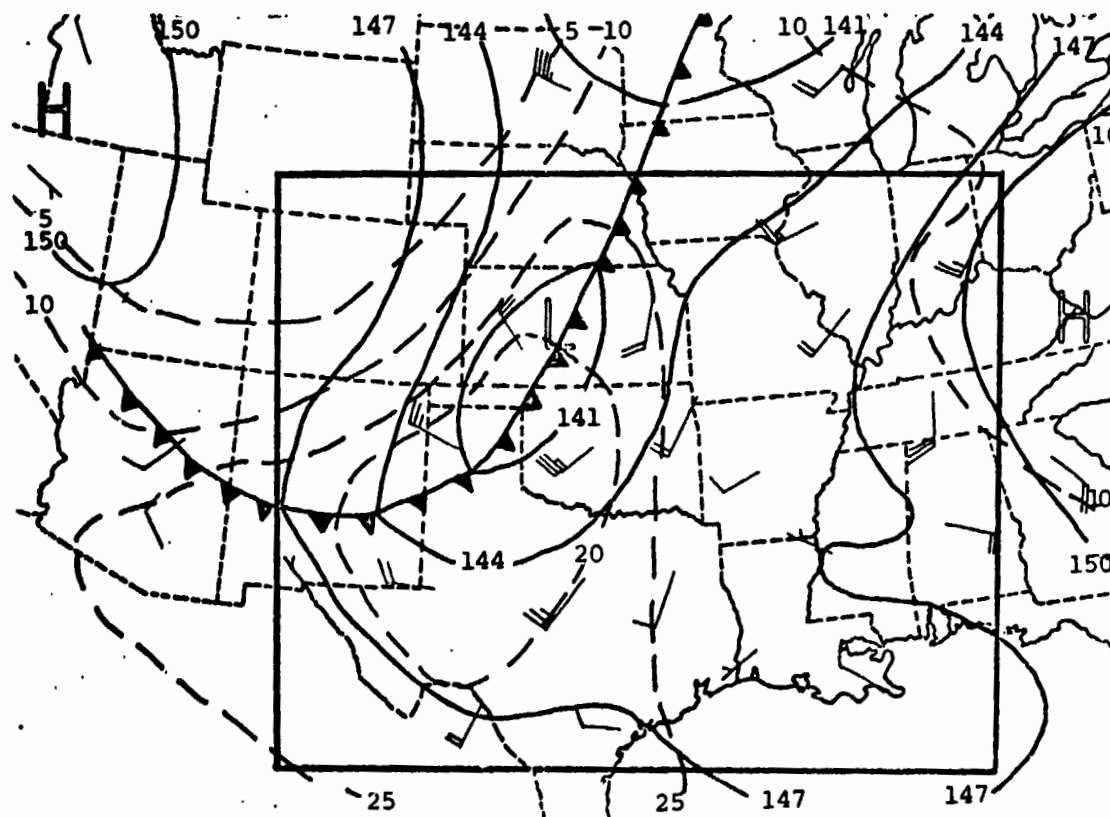
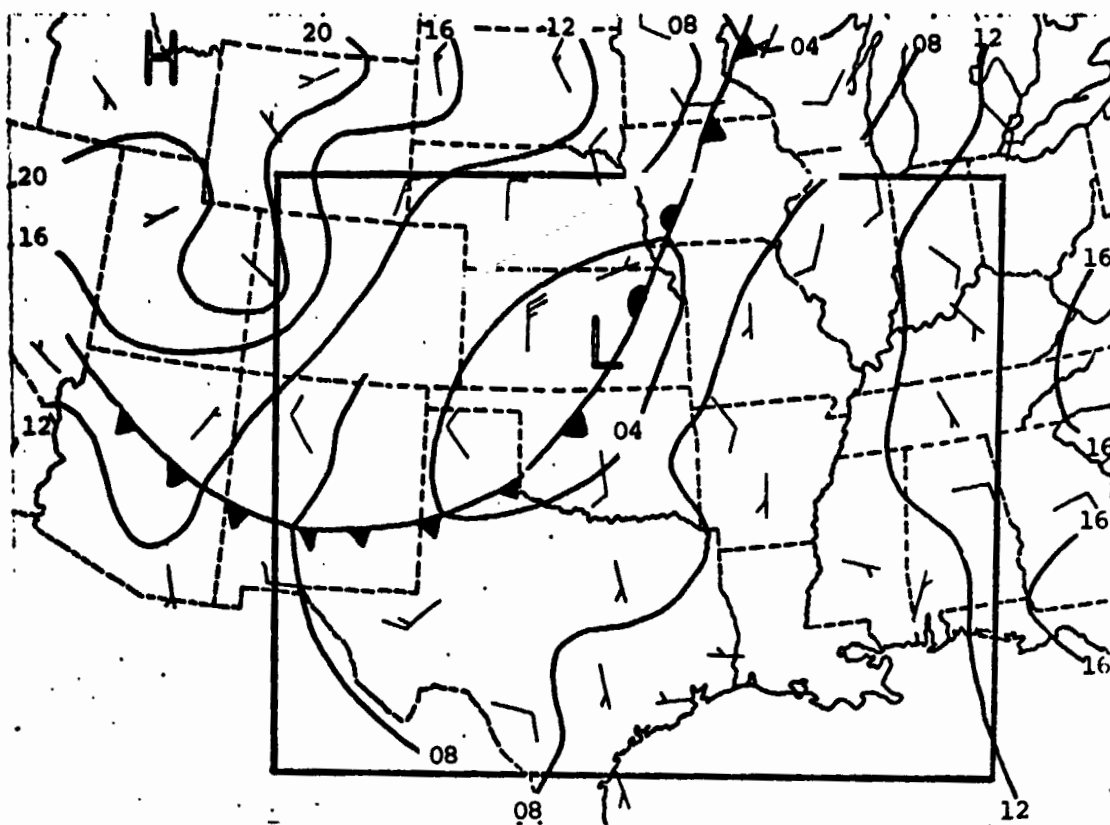
d. Rainfall

Rainfall data obtained from the National Weather Service were totaled and plotted for the AVE-SESAME III period. Isohyets of total rainfall are presented in Fig. 44. Special or cooperative climatological

station data were not used in the analysis.

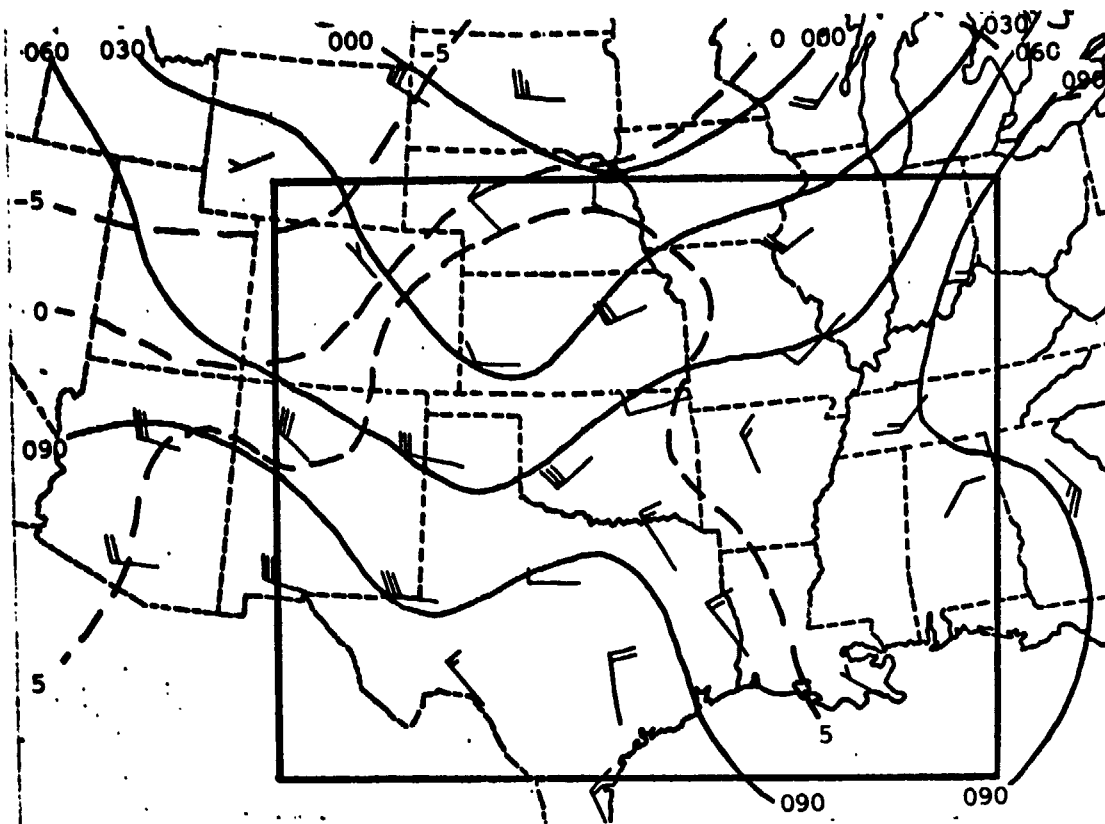
4. SEVERE AND UNUSUAL WEATHER REPORTED

The severe weather outbreak during the AVE-SESAME III period produced only two major thunderstorms, but displayed the potential to develop into a major storm system. The two severe thunderstorms developed in the vicinity of Springfield, Missouri, and produced marble and walnut size hail. A severe thunderstorm watch was in effect until 0630 GMT 26 April 1979 for portions of Missouri and Illinois. A list of severe weather reports compiled from the NOAA weather wire and national weather summaries when available are presented in Table 2. Locations of significant severe weather reports are shown in Fig. 45.

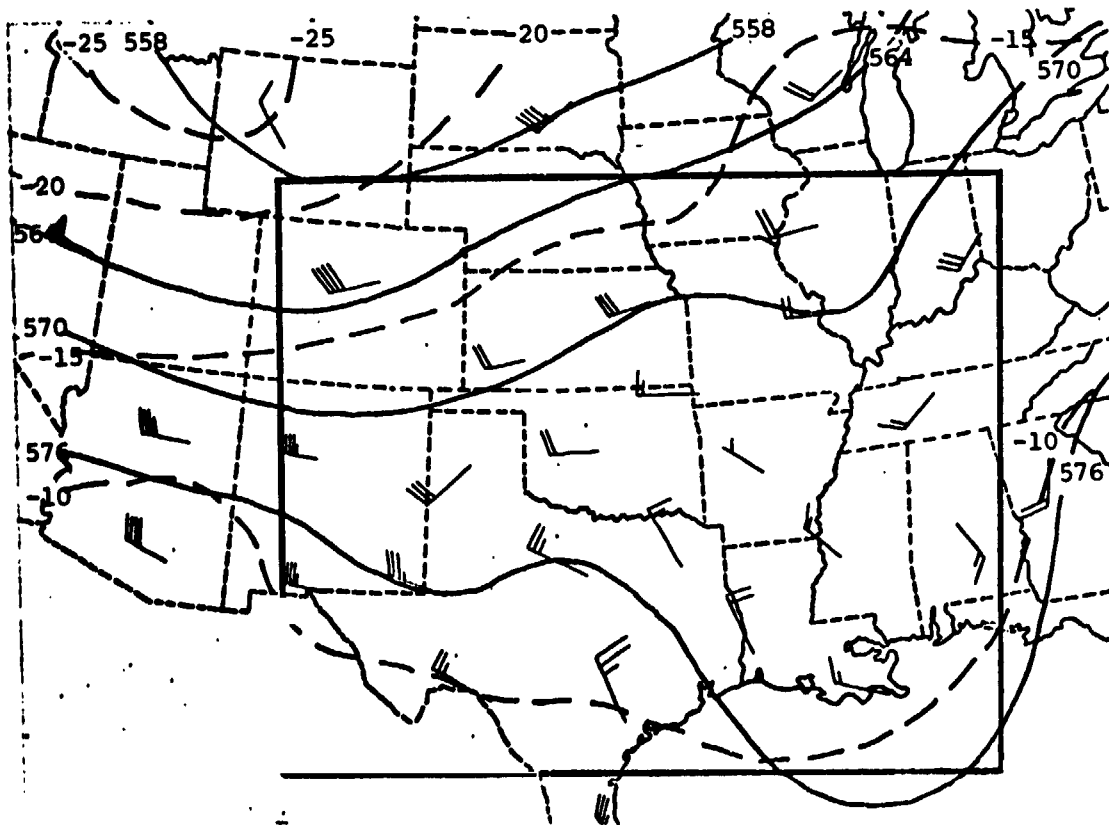


(b) 850 mb

Fig. 2. Synoptic charts for 1200 GMT 25 April 1979.

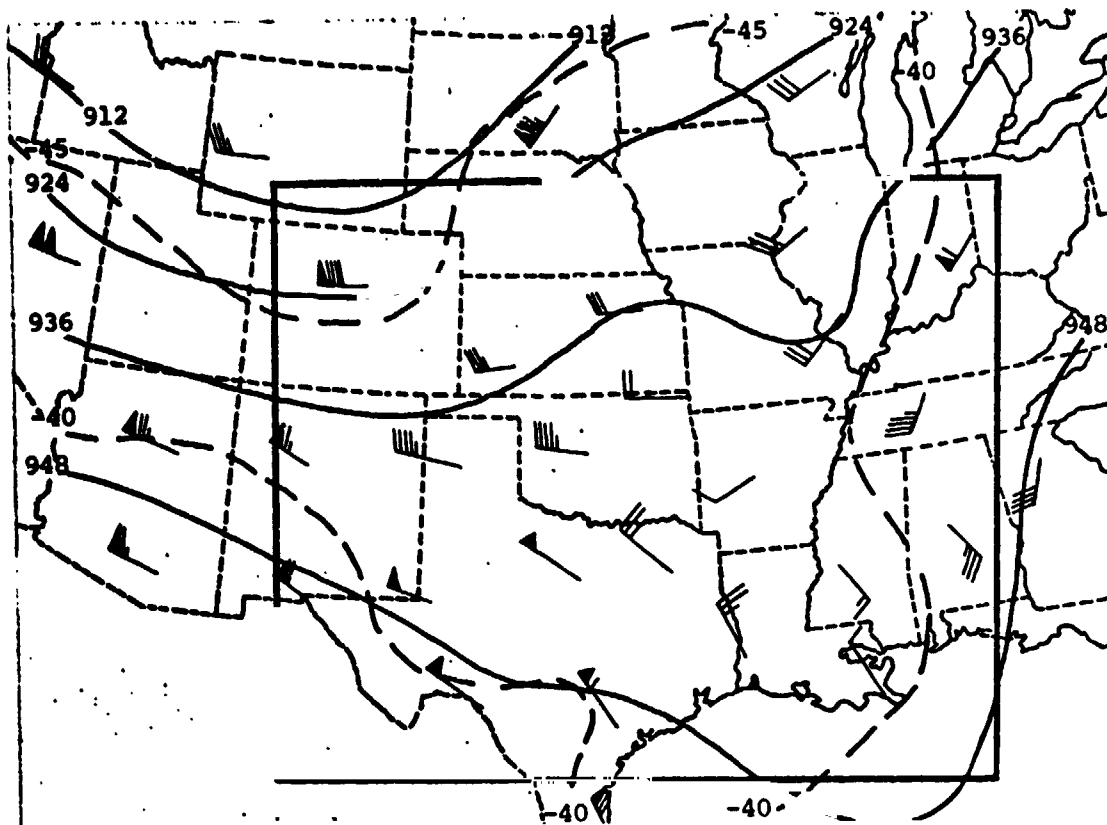


(c) 700 mb

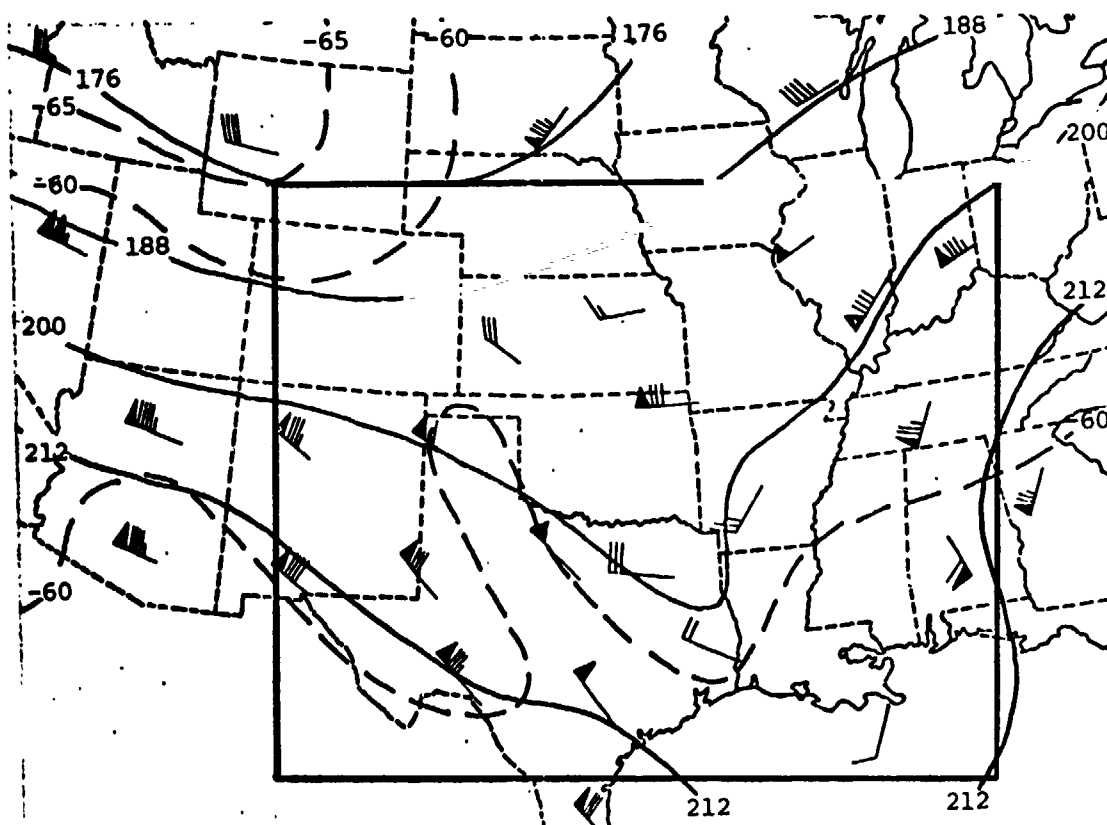


(d) 500 mb

Fig. 2. Continued.



(e) 300 mb



(f) 200 mb

Fig. 2. Concluded.

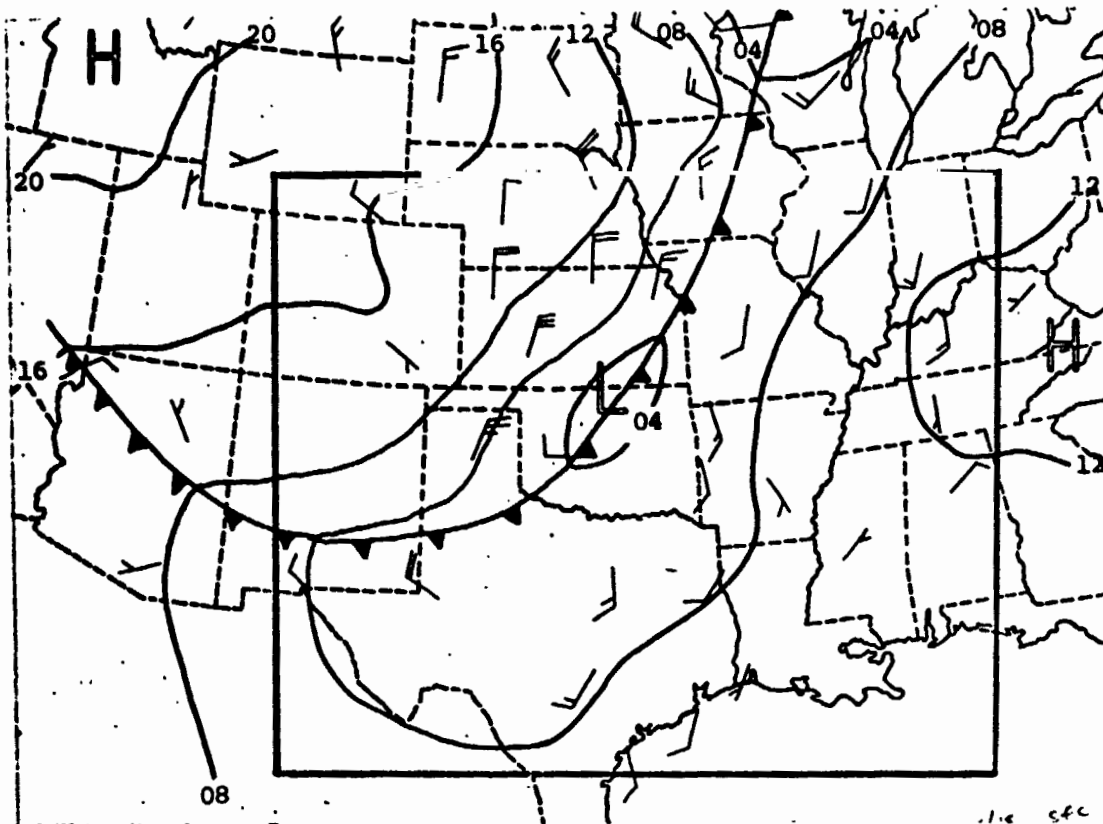
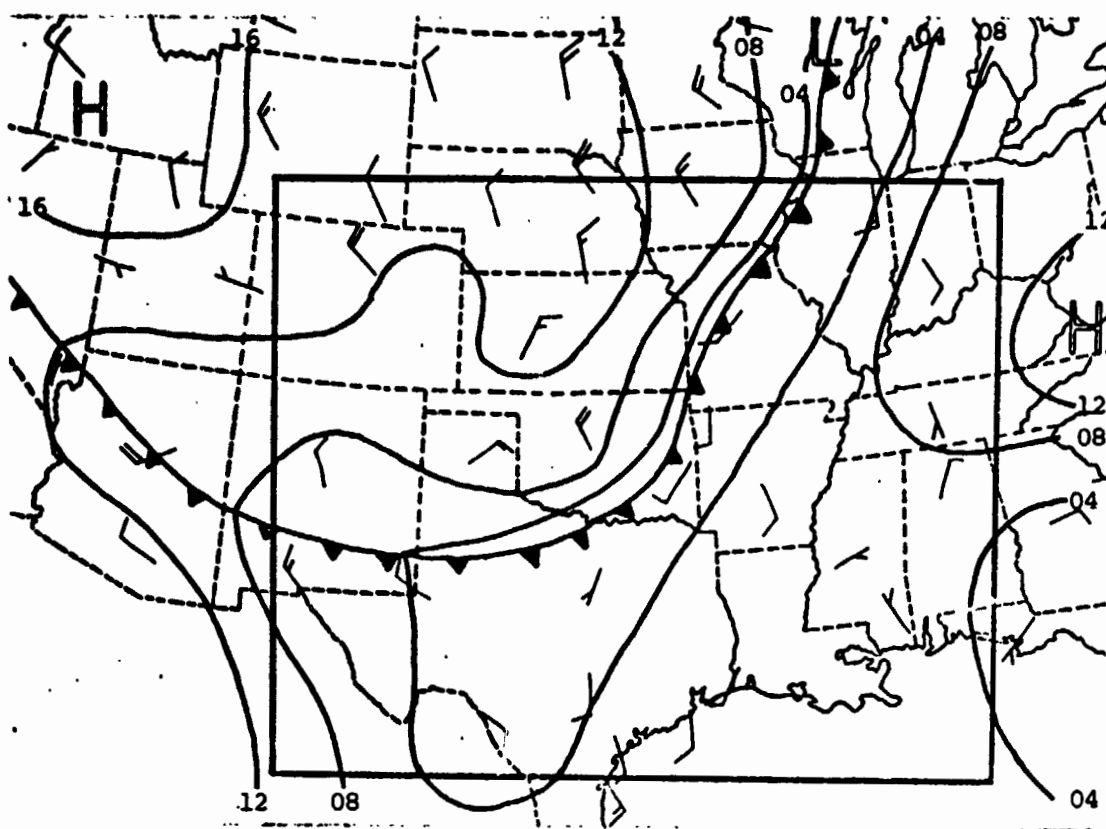
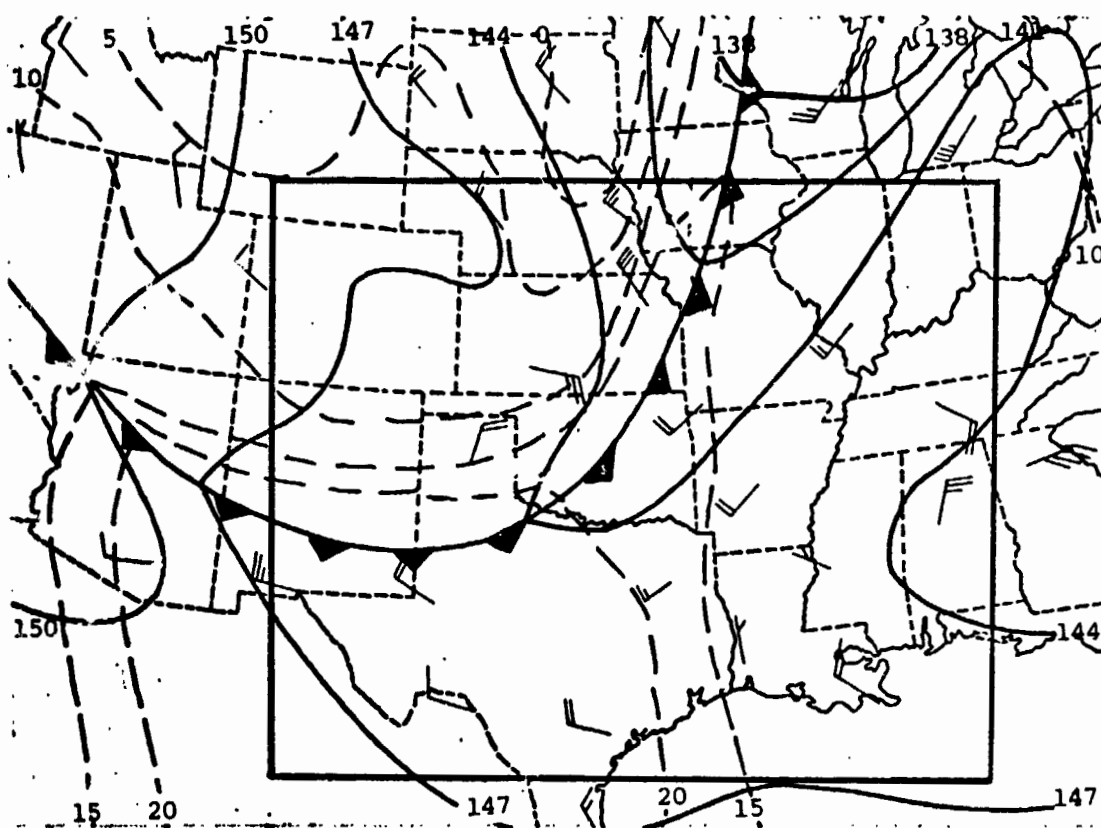


Fig. 3. Surface chart for 1800 GMT 25 April 1979.

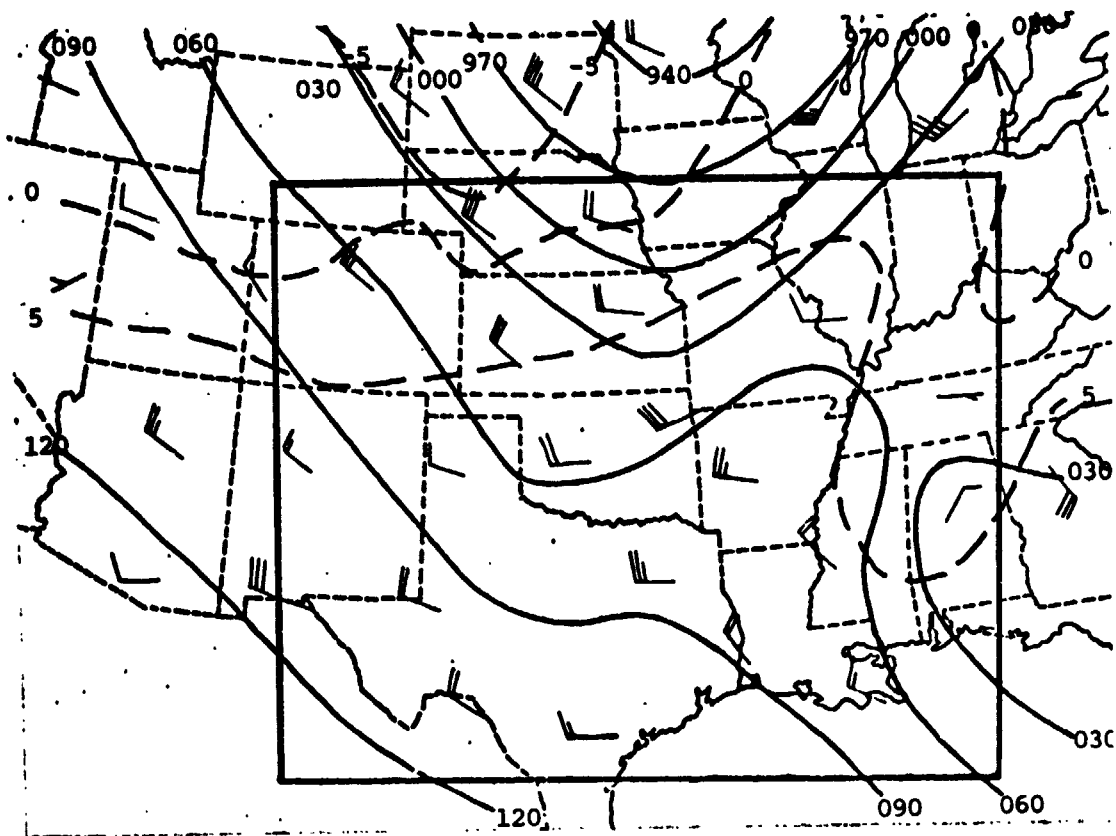


(a) Surface

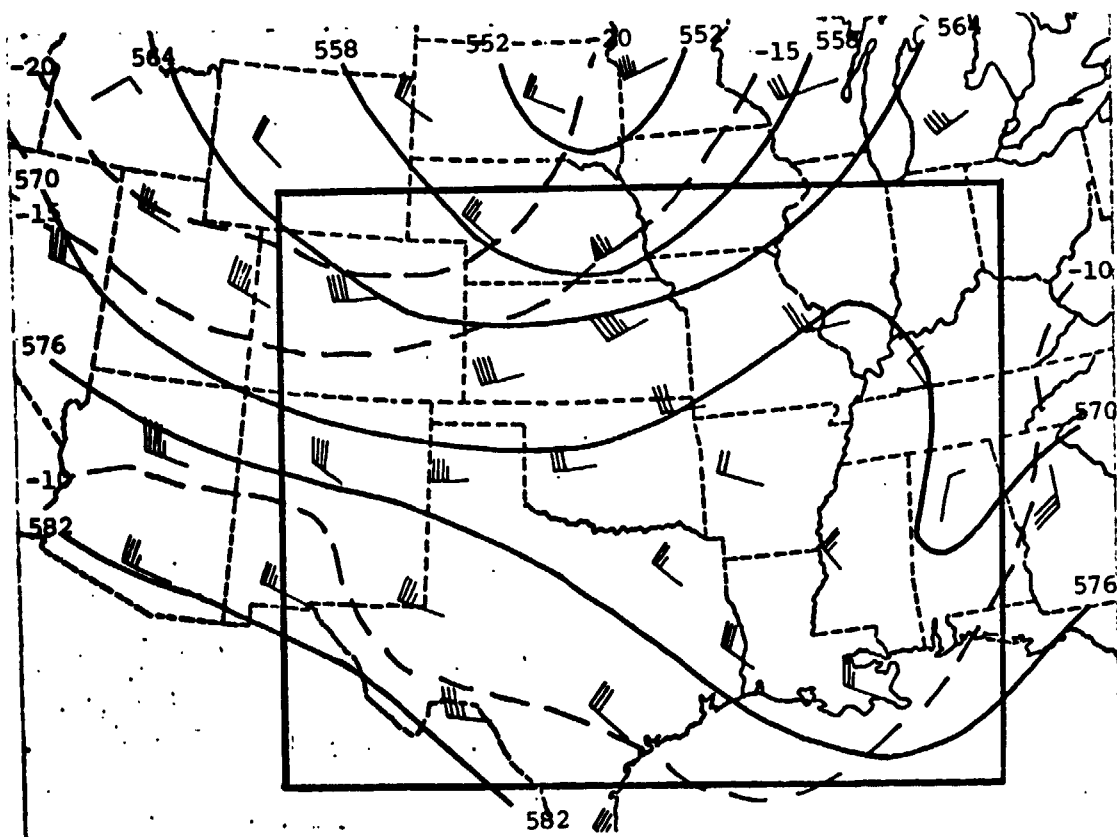


(b) 850 mb

Fig. 4. Synoptic charts for 0000 GMT 26 April 1979.

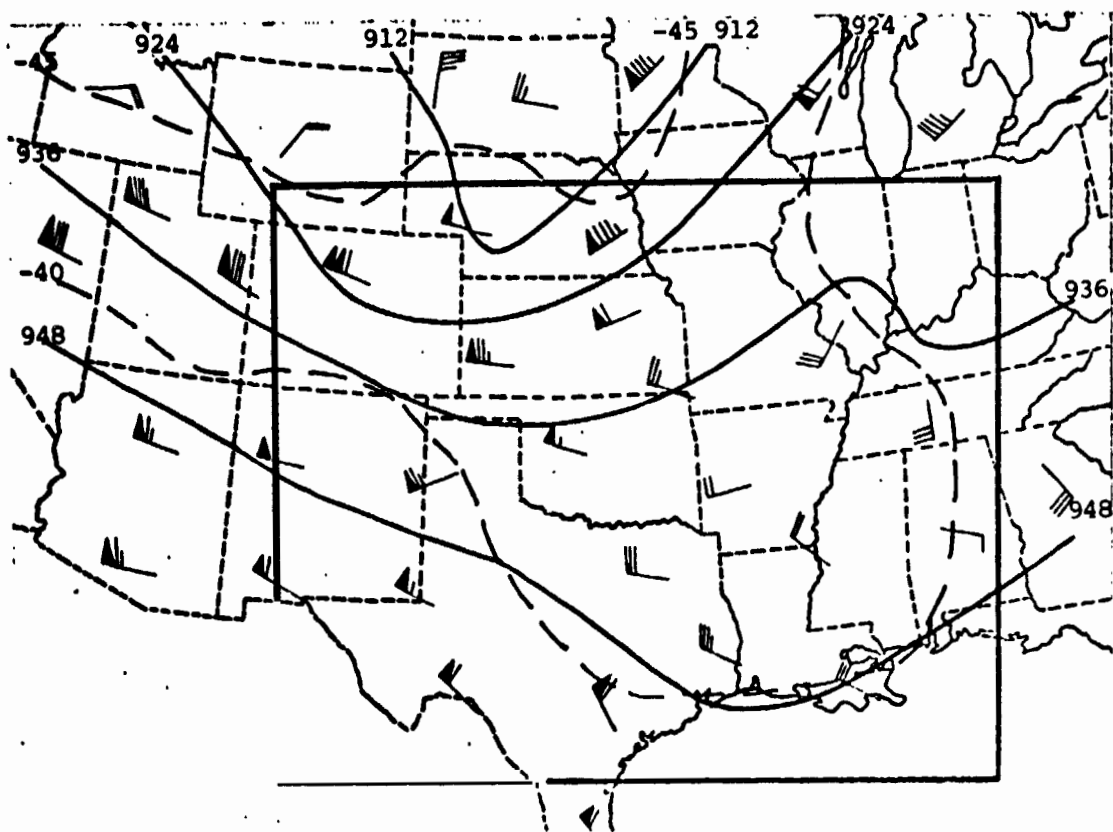


(c) 700 mb

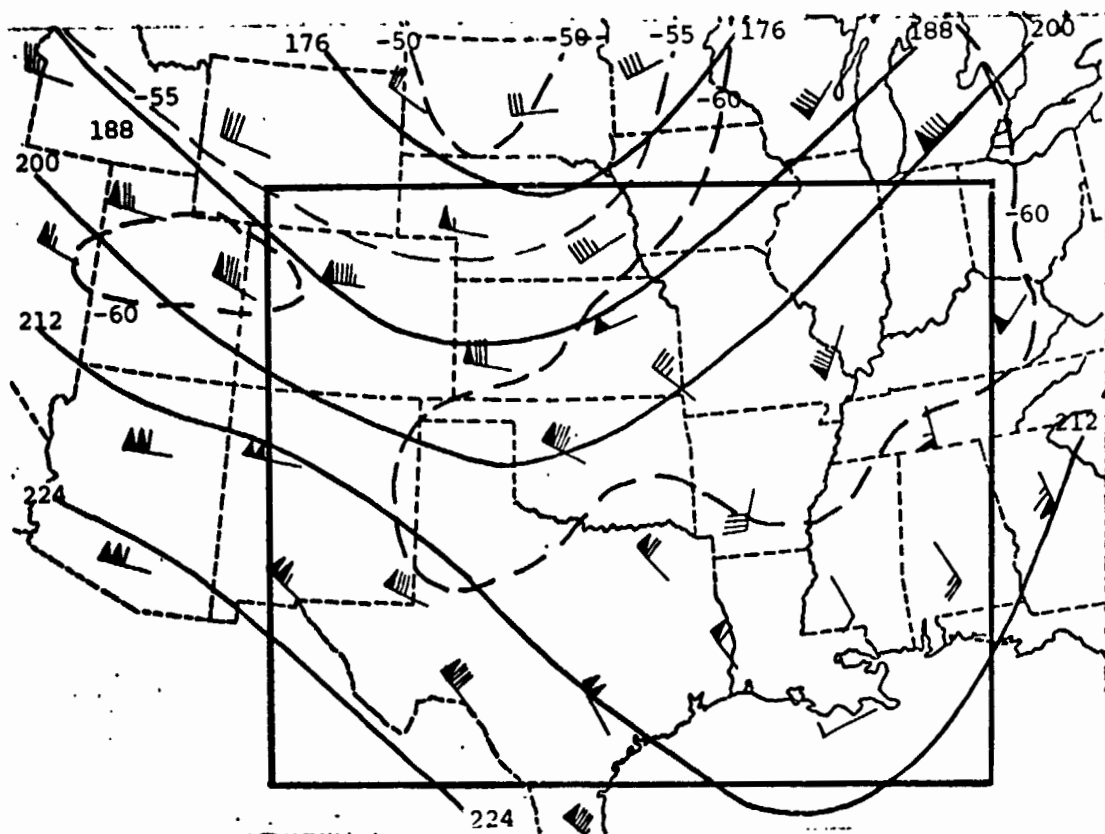


(d) 500 mb

Fig. 4. Continued.



(e) 300 mb



(f) 200 mb

Fig. 4. Concluded.

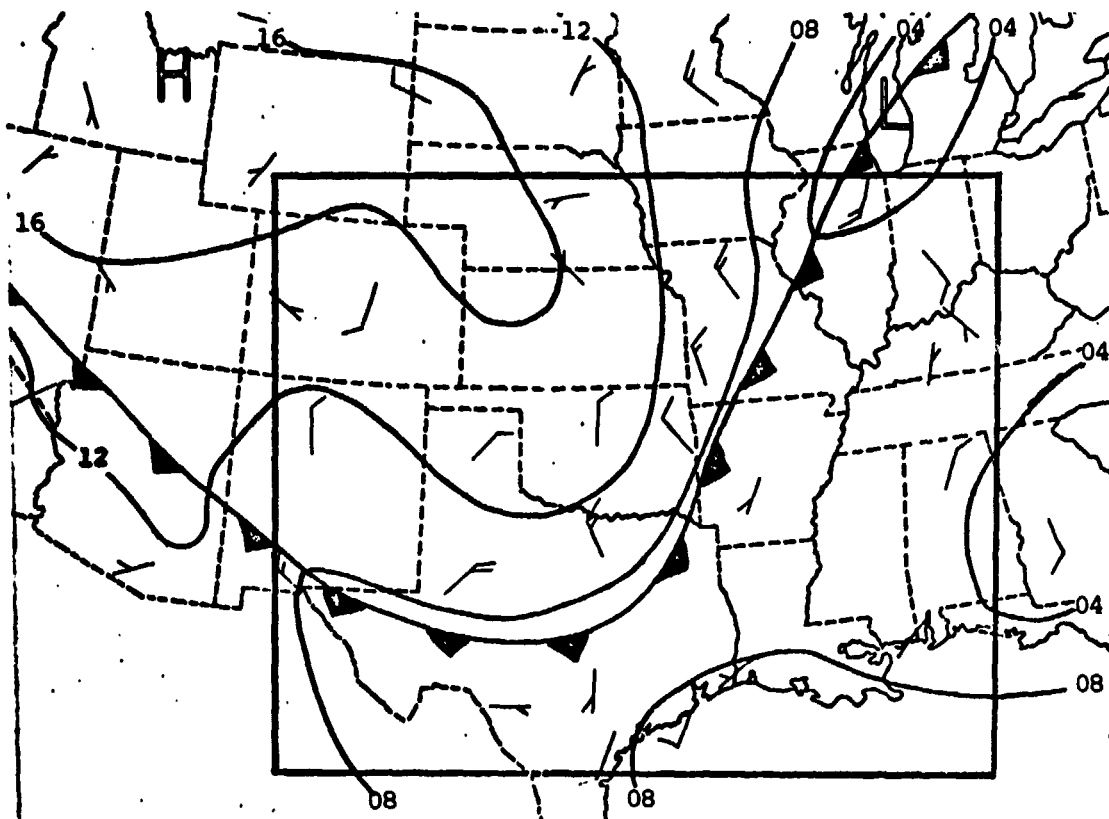
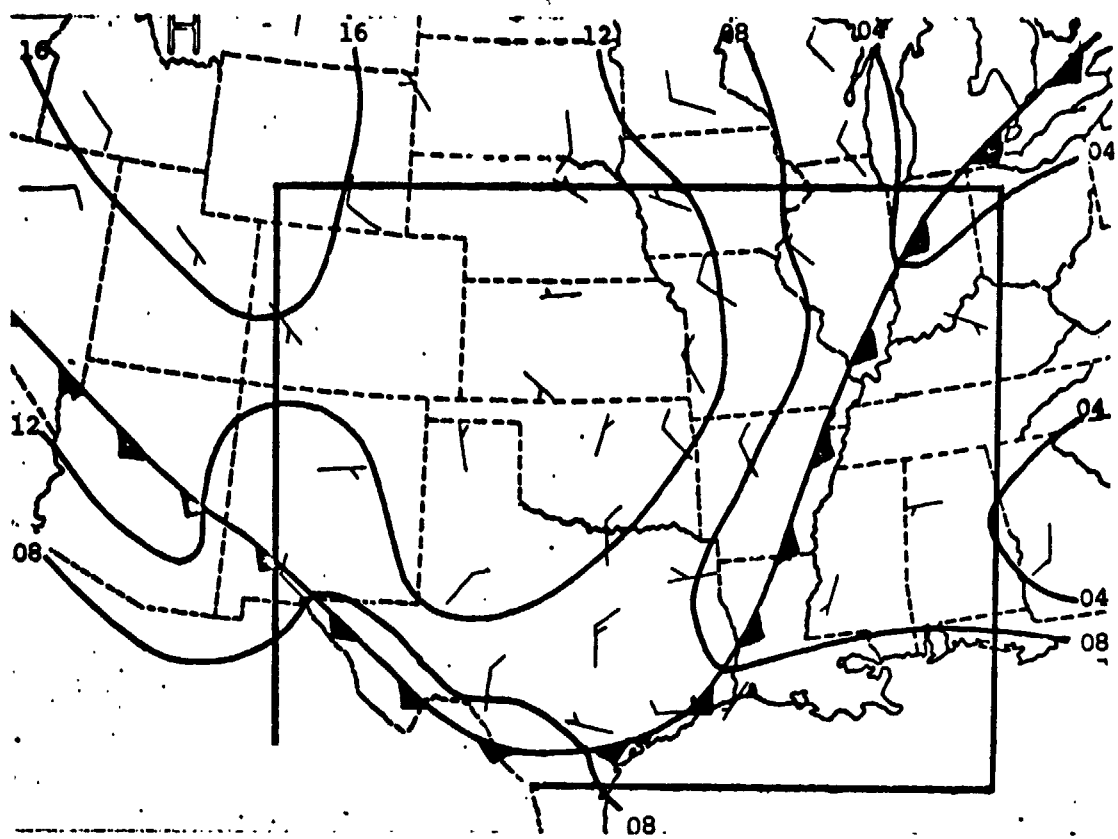
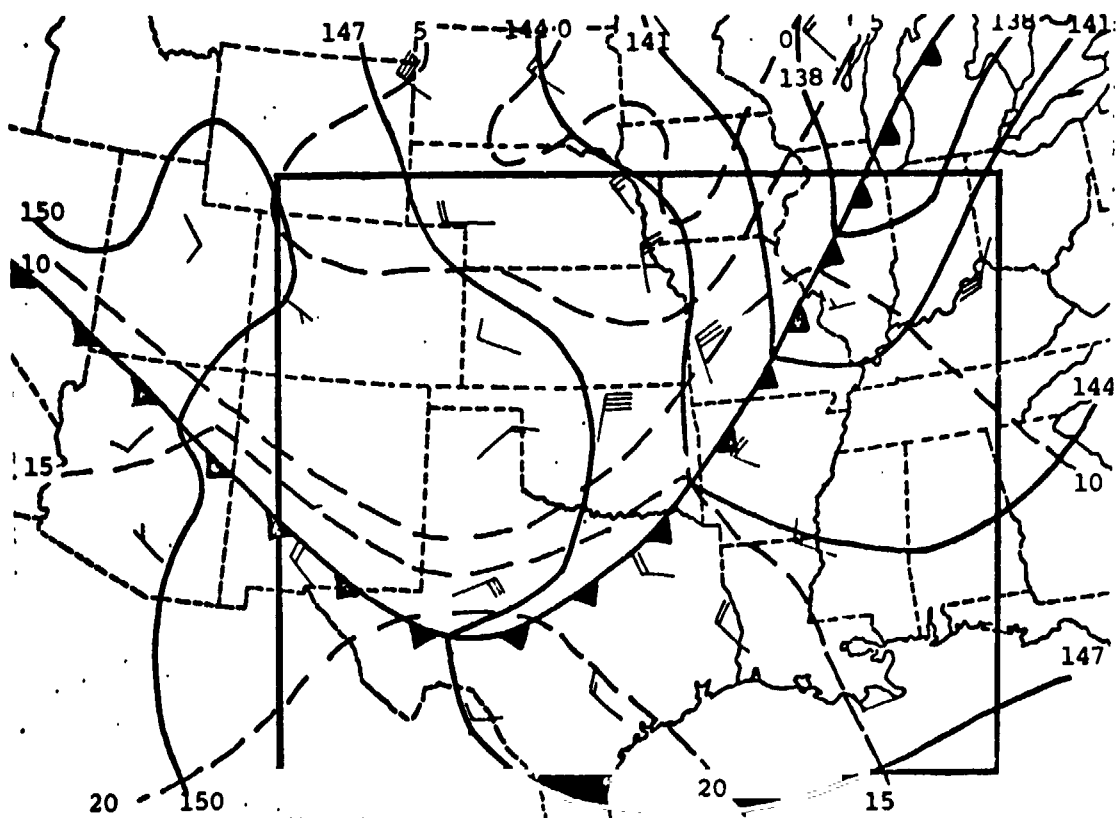


Fig. 5. Surface chart for 0600 GMT 26 April 1979.

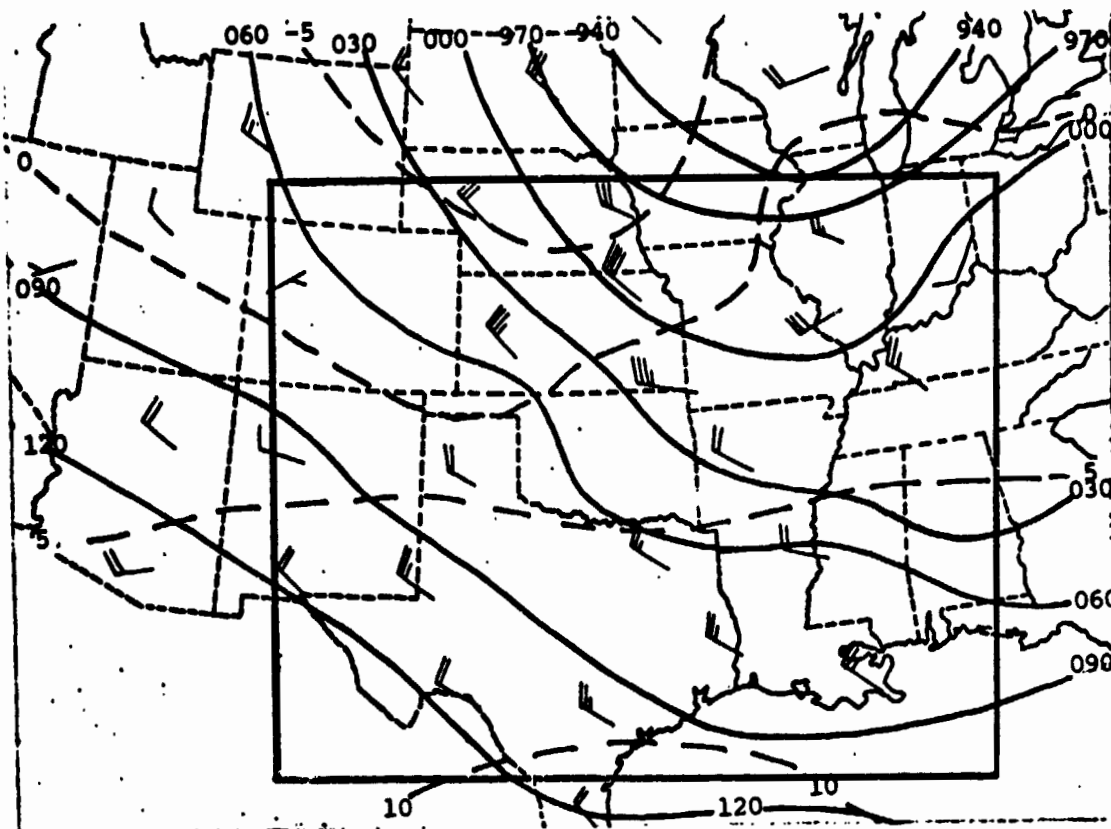


(a) Surface

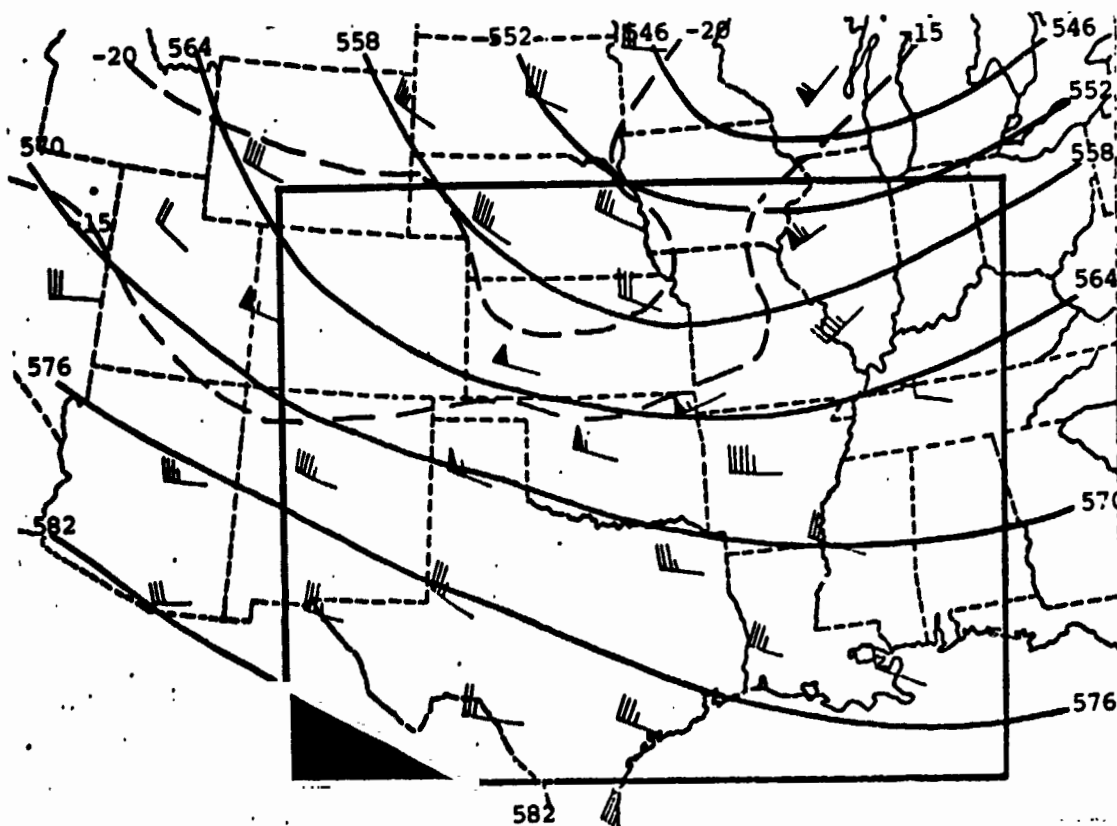


(b) 850 mb

Fig. 6. Synoptic charts for 1200 GMT 26 April 1979.

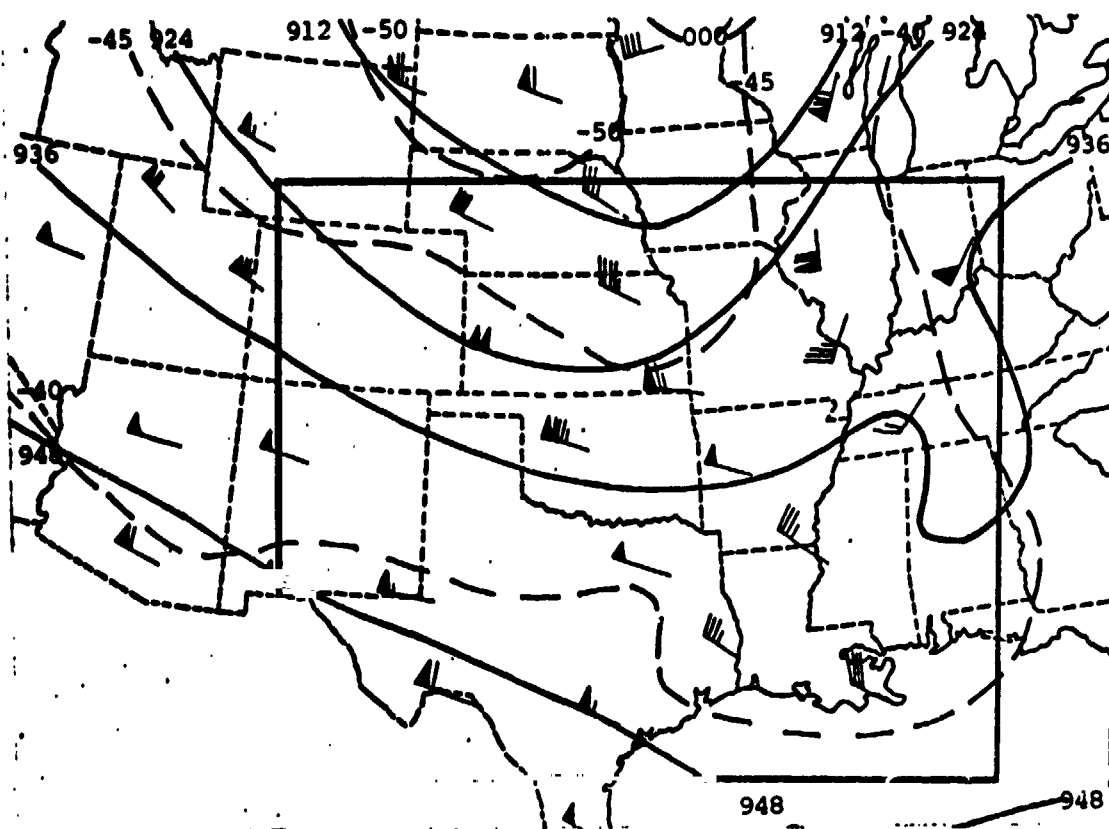


(c) 700 mb

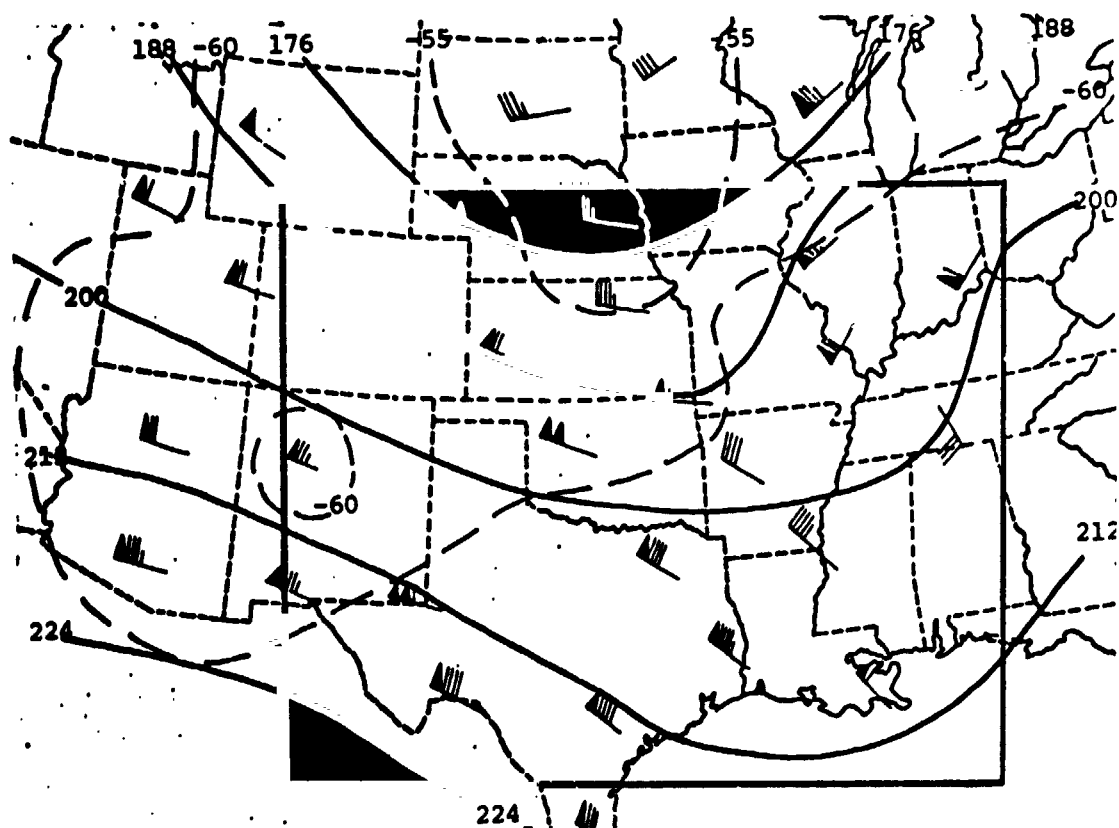


(d) 500 mb

Fig. 6. Continued.



(e) 300 mb



(f) 200 mb

Fig. 6. Concluded.

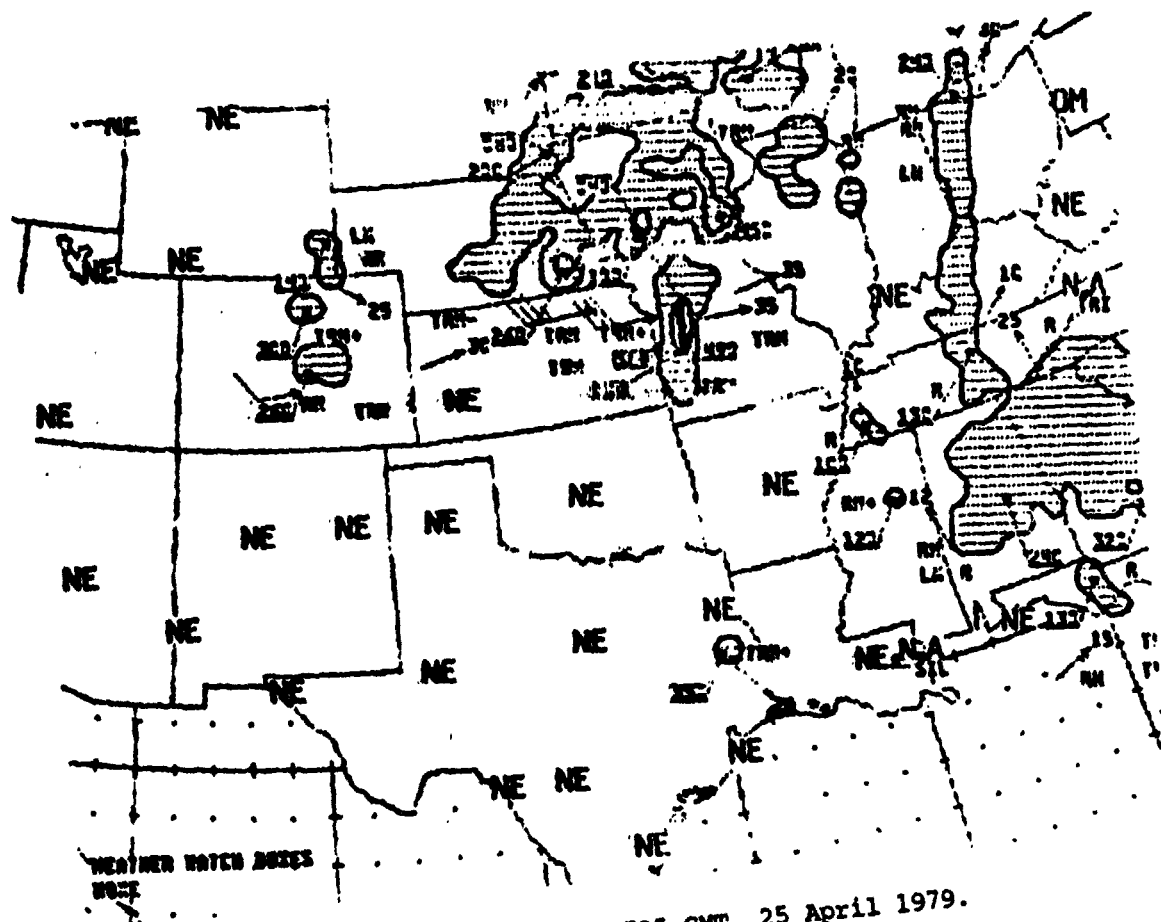


Fig. 7. Radar summary for 1735 GMT 25 April 1979.

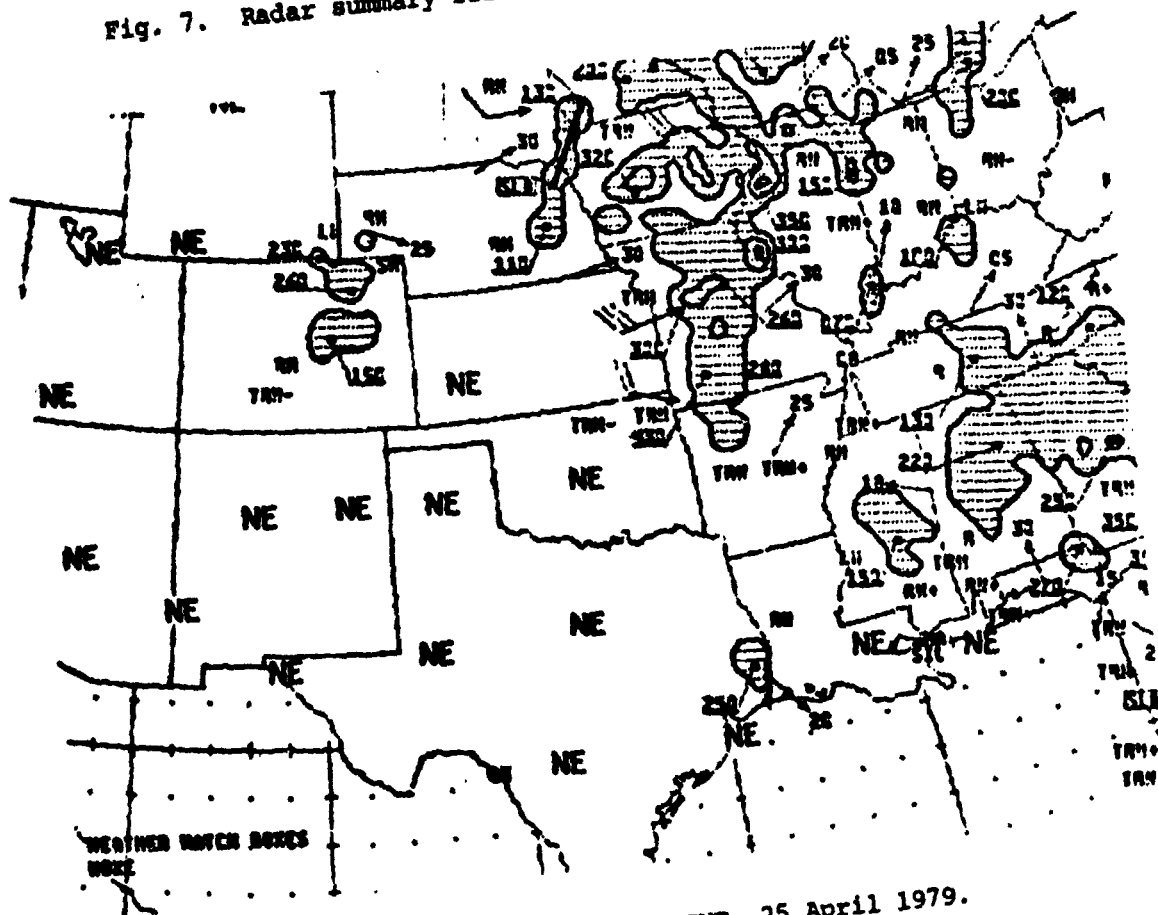


Fig. 8. Radar summary for 1935 GMT 25 April 1979.

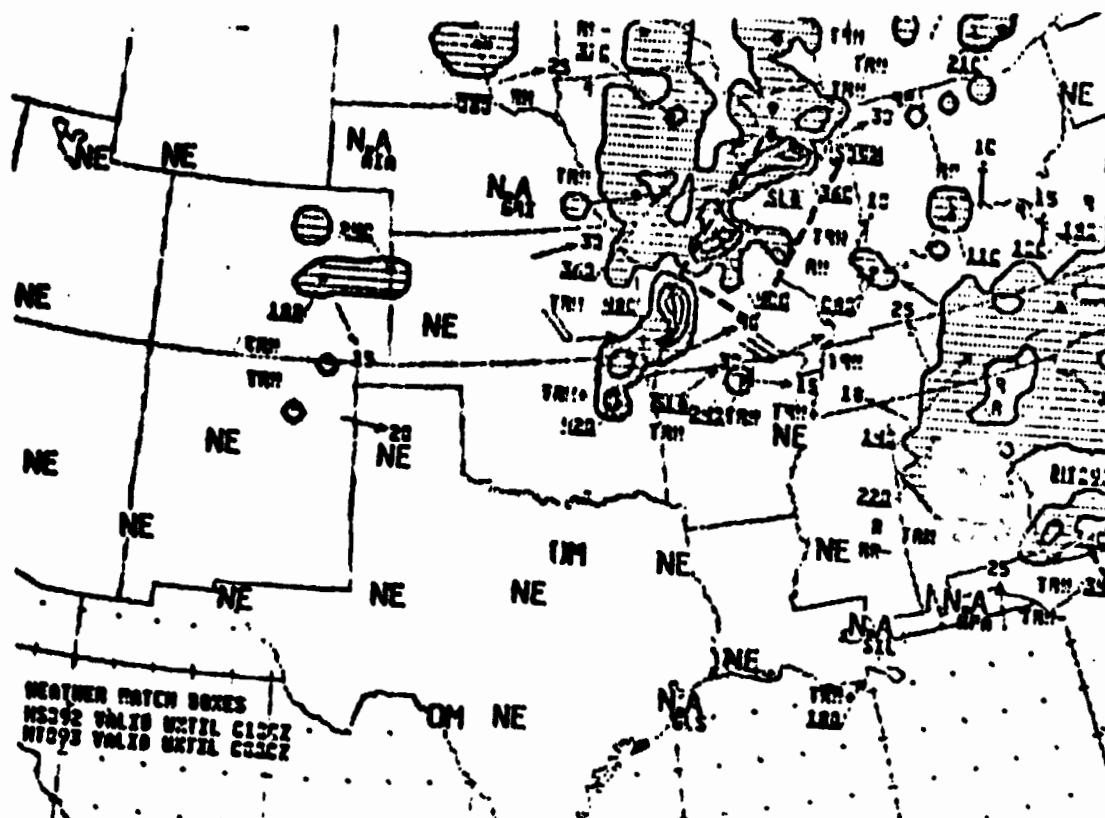


Fig. 9. Radar summary for 2235 GMT 25 April 1979.

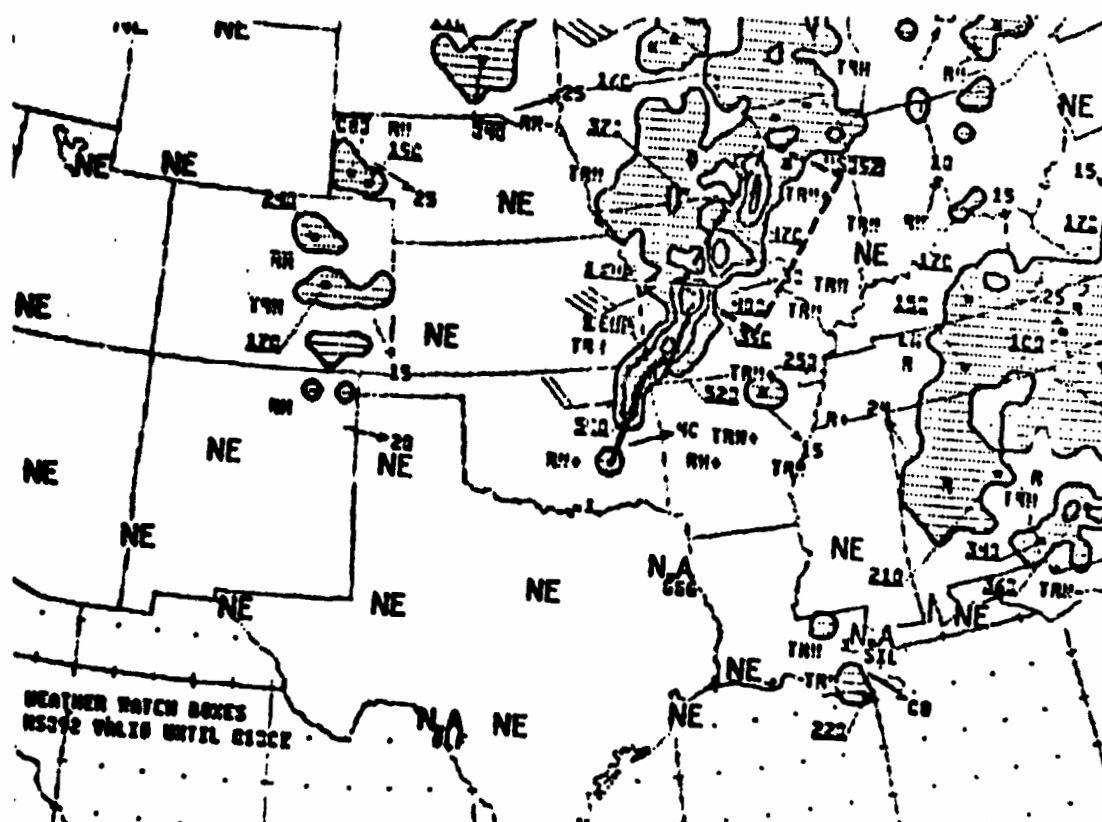


Fig. 10. Radar summary for 2335 GMT 25 April 1979.

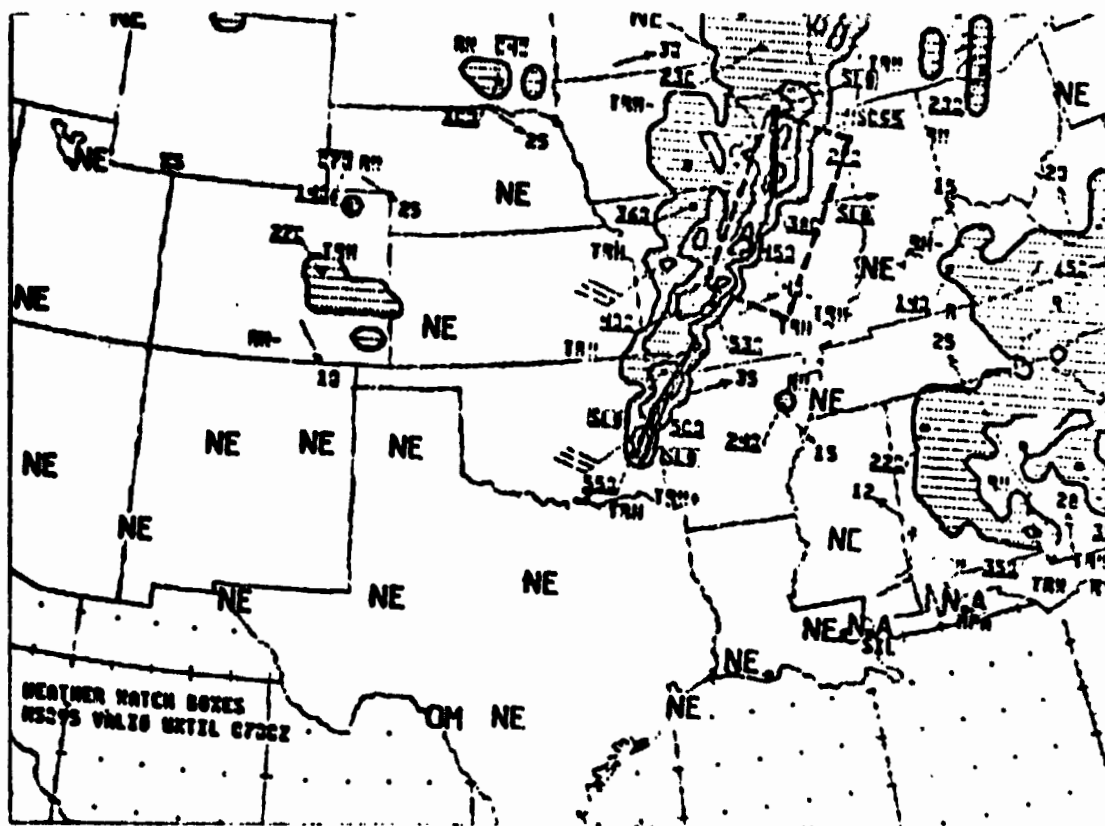


Fig. 11. Radar summary for 0135 GMT 26 April 1979.

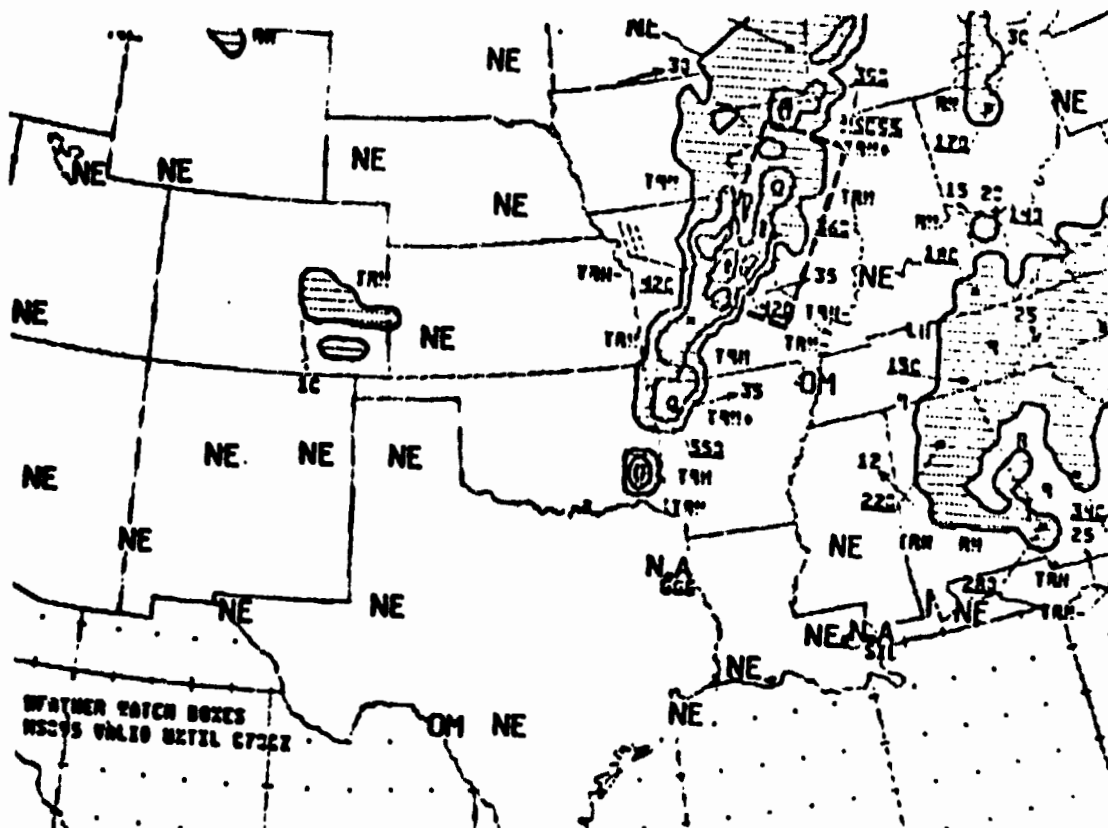


Fig. 12. Radar summary for 0235 GMT 26 April 1979.

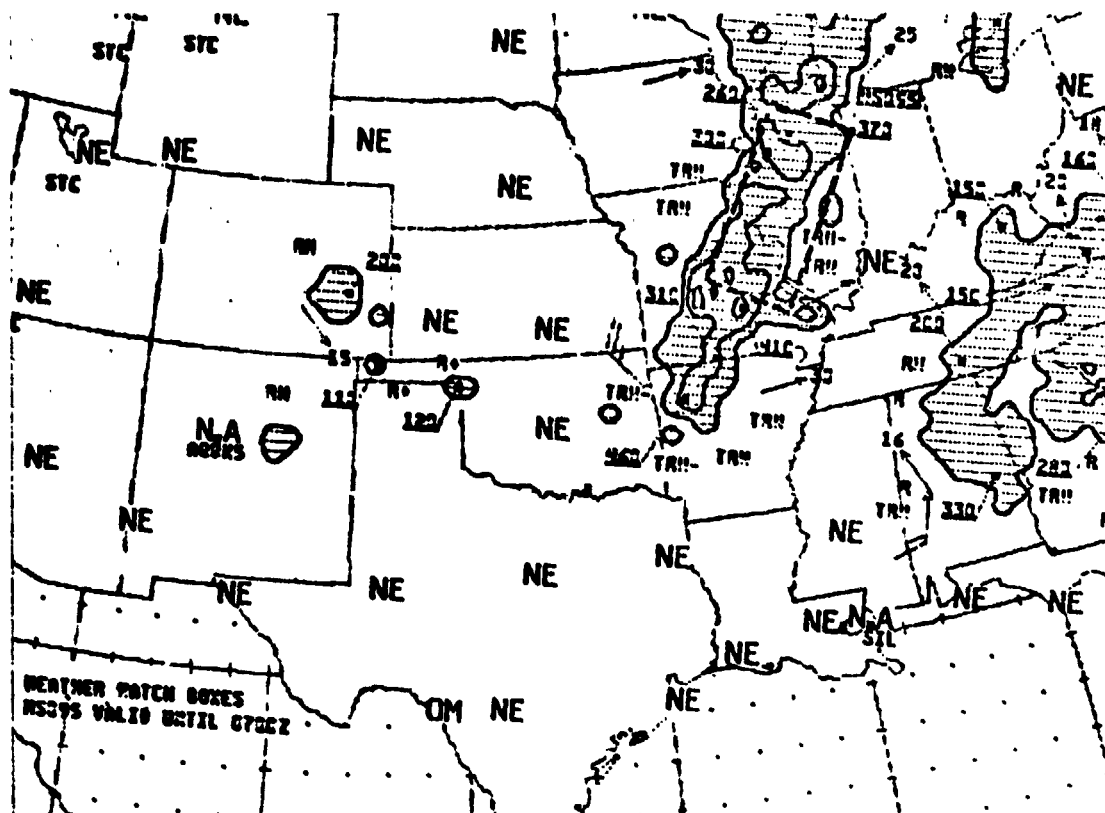


Fig. 13. Radar summary for 0435 GMT 26 April 1979.

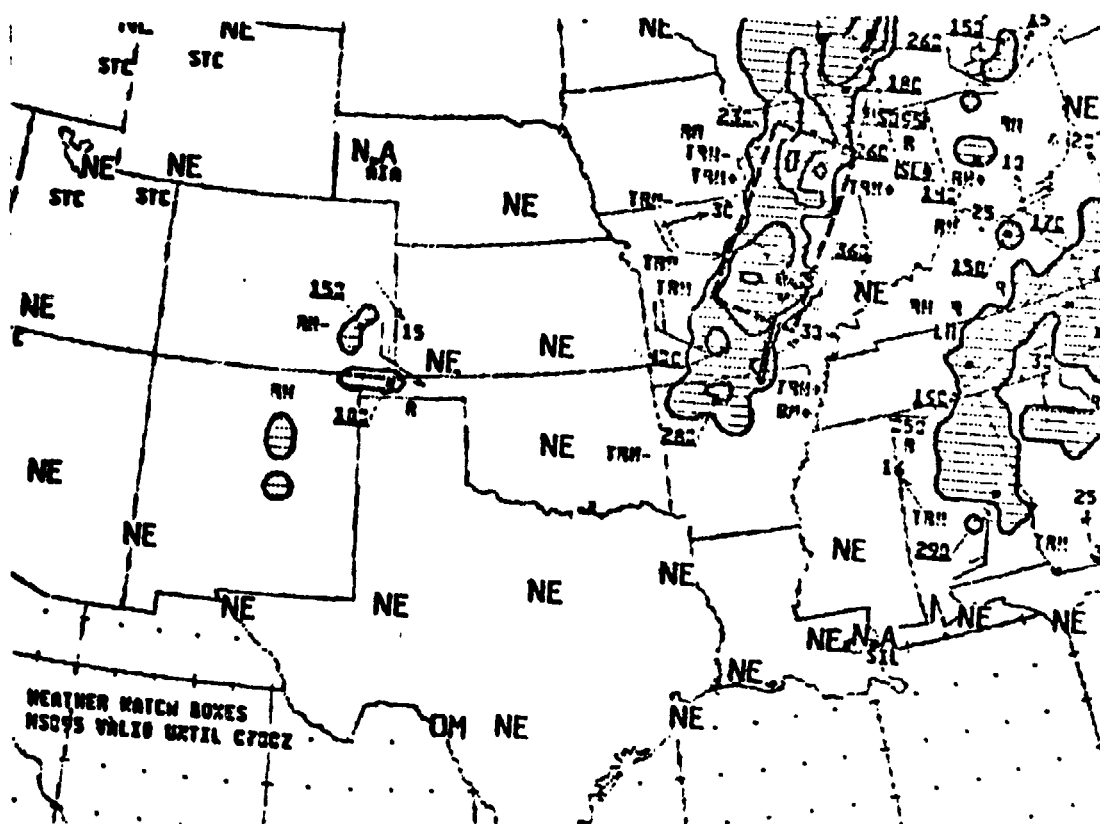


Fig. 14. Radar summary for 0535 GMT 26 April 1979.

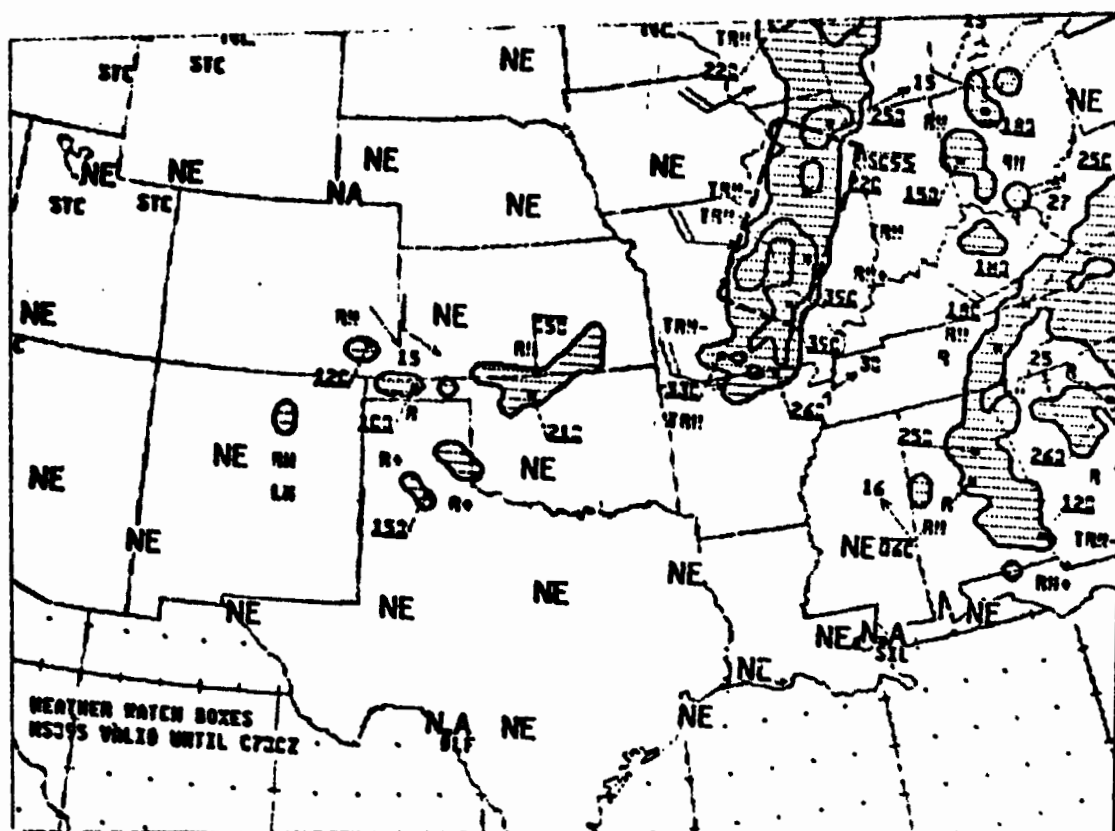


Fig. 15. Radar summary for 0635 GMT 26 April 1979.

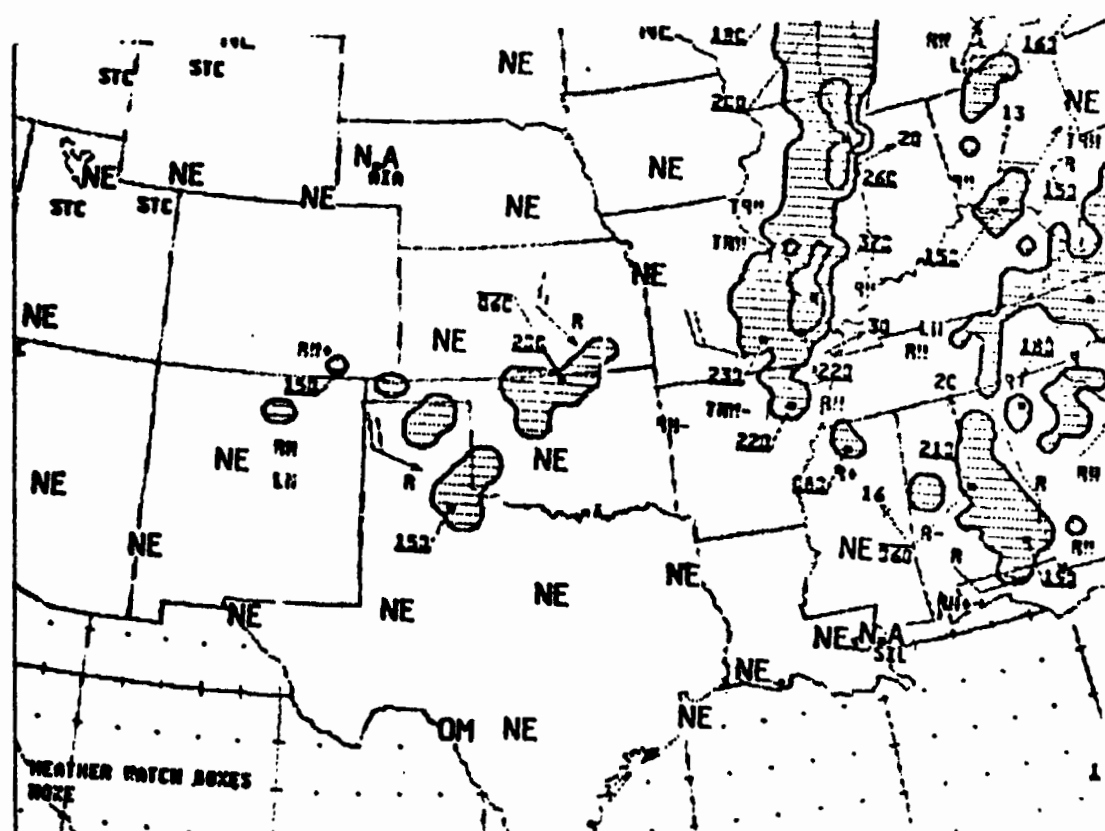


Fig. 16. Radar summary for 0735 GMT 26 April 1979.

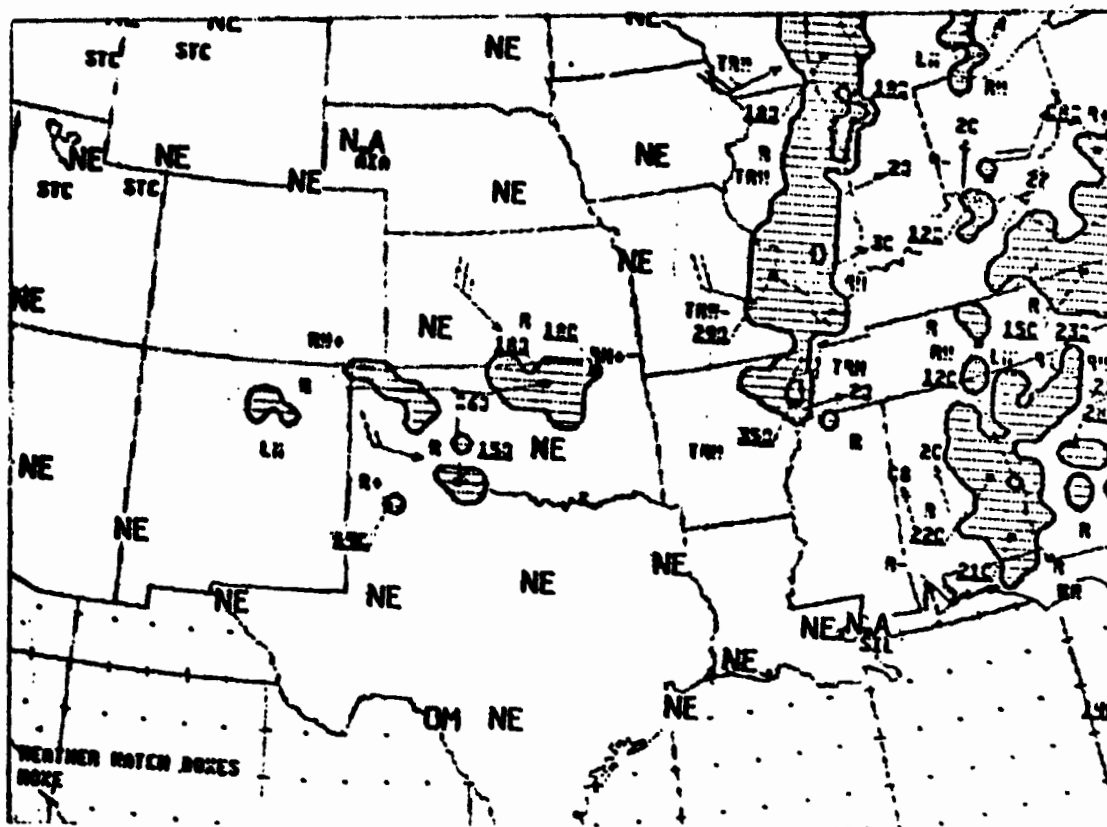


Fig. 17. Radar summary for 0835 GMT 26 April 1979.

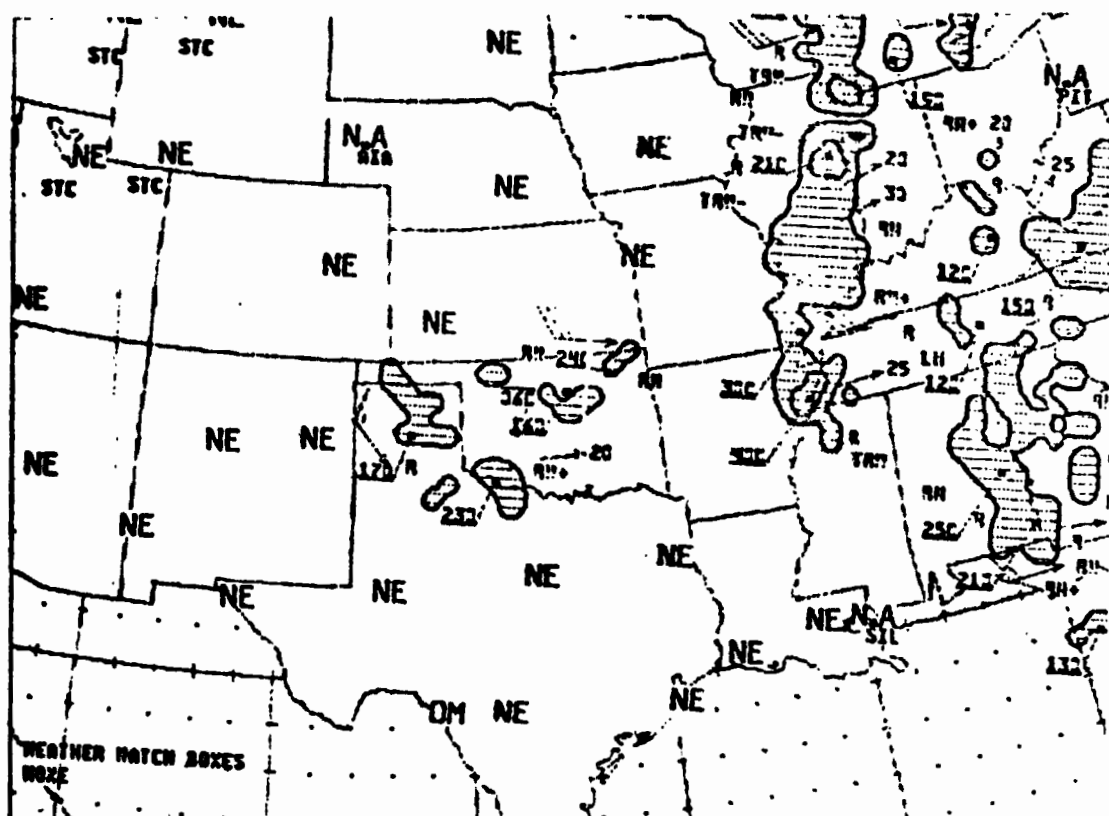


Fig. 18. Radar summary for 0935 GMT 26 April 1979.

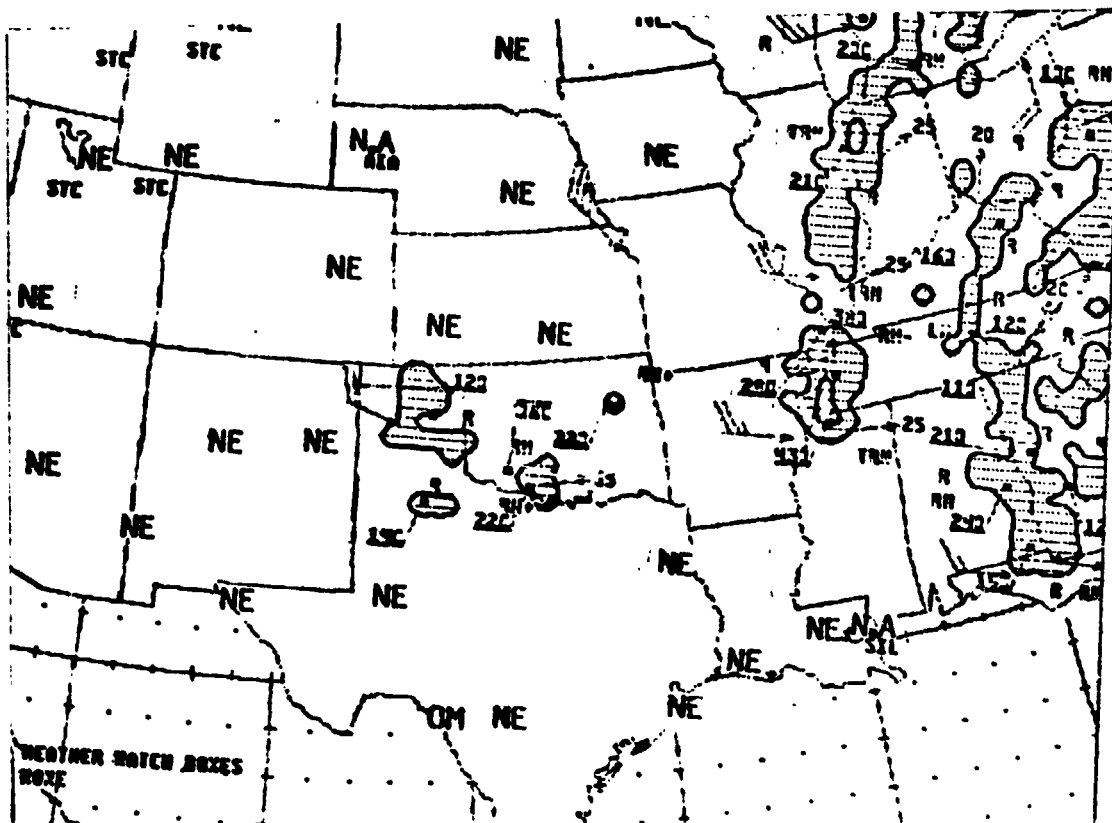


Fig. 19. Radar summary for 1035 GMT 26 April 1979.

1201 25AP79 12E-22A 01541 13951 KB34N93W



Fig. 20. GOES-East infrared satellite imagery for 1201 GMT
25 April 1979.

1301 25AP79 12A-2 01533 13972 KB34N93W

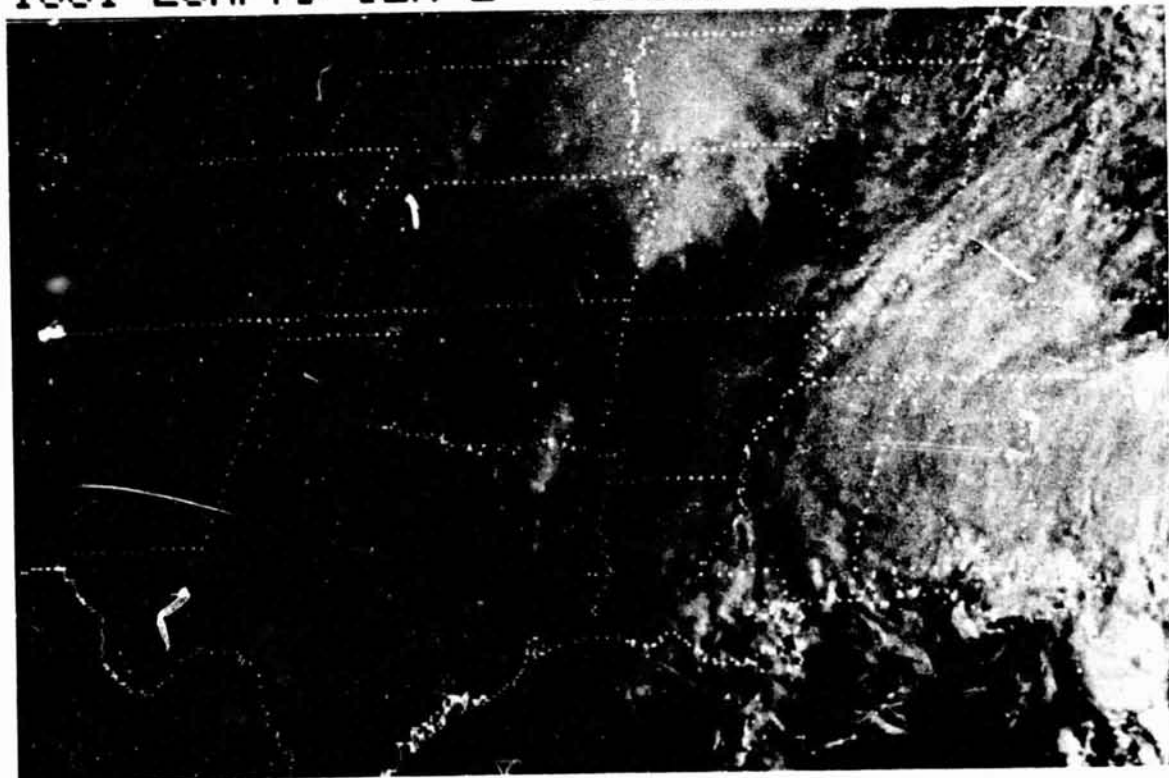


Fig. 21. GOES-East visual satellite imagery for 1301 GMT
25 April 1979.

1401 25AP79 12A-2 01542 13991 KB34N93W

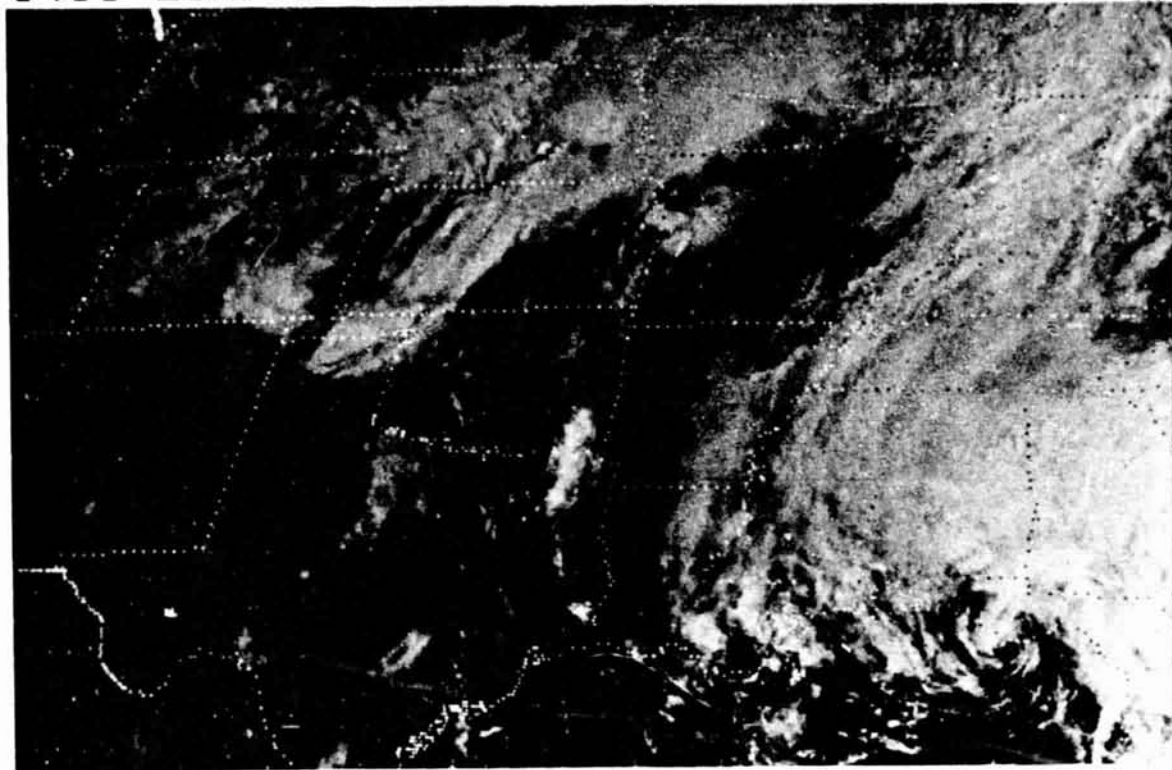


Fig. 22. GOES-East visual satellite imagery for 1401 GMT
25 April 1979.

1501 25AP79 12A-2 01541 14001 KB34N93W

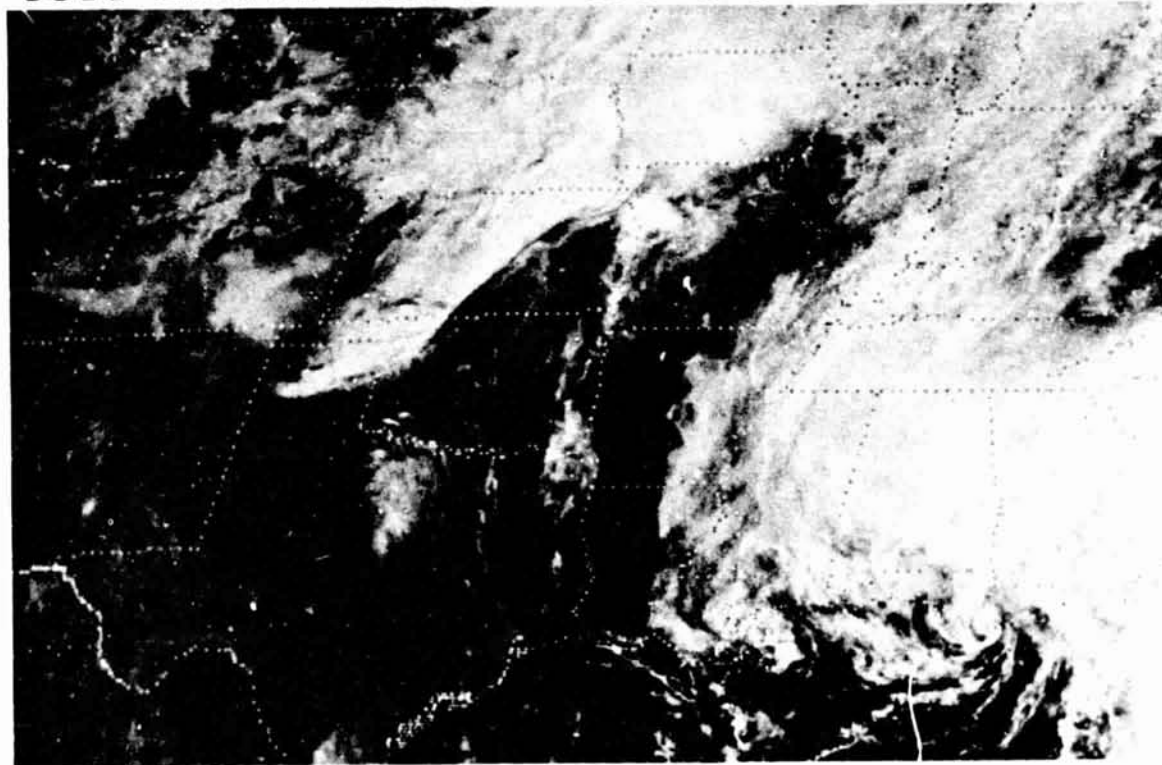


Fig. 23. GOES-East visual satellite imagery for 1501 GMT
25 April 1979.

1601 25AP79 12A-2 01533 14002 KB34N93W

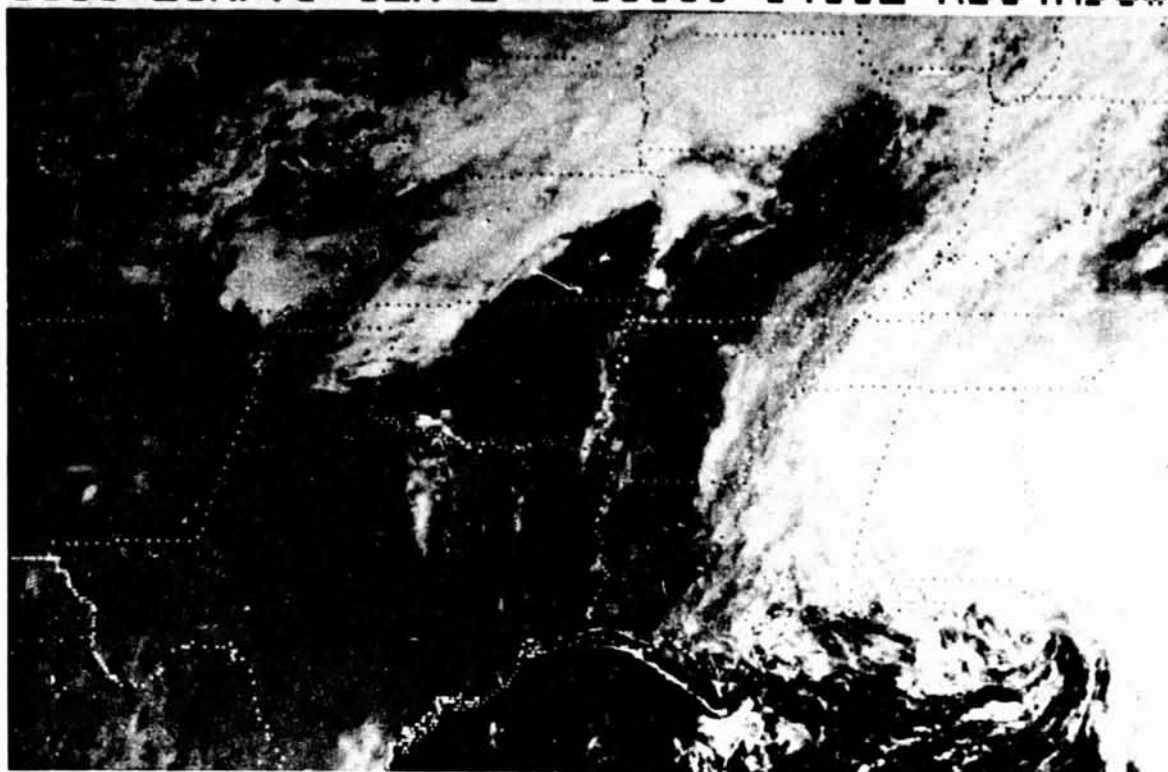


Fig. 24. GOES-East visual satellite imagery for 1601 GMT
25 April 1979.

1701 25AP79 12A-2 01541 13992 KB34N93W

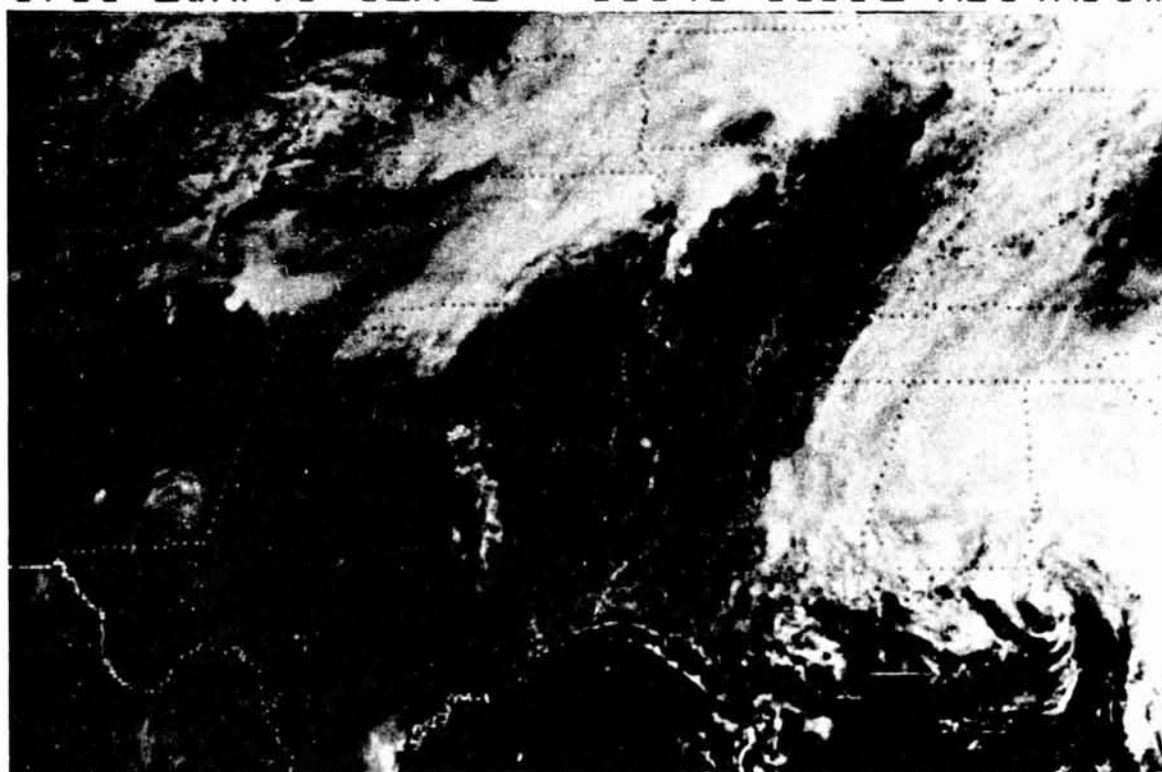


Fig. 25. GOES-East visual satellite imagery for 1701 GMT
25 April 1979.

1801 25AP79 12A-2 01533 13981 KB34N93W

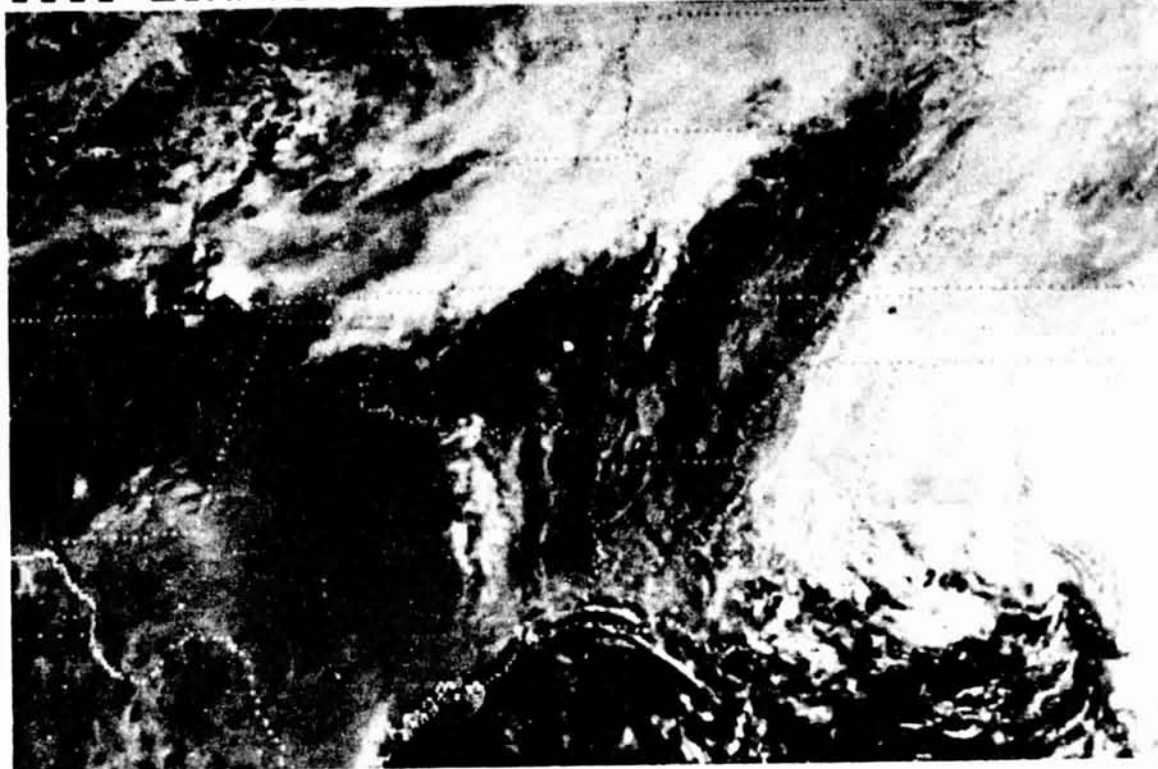


Fig. 26. GOES-East visual satellite imagery for 1801 GMT
25 April 1979.

1901 25AP79 12A-2 01542 13961 KB34N93W

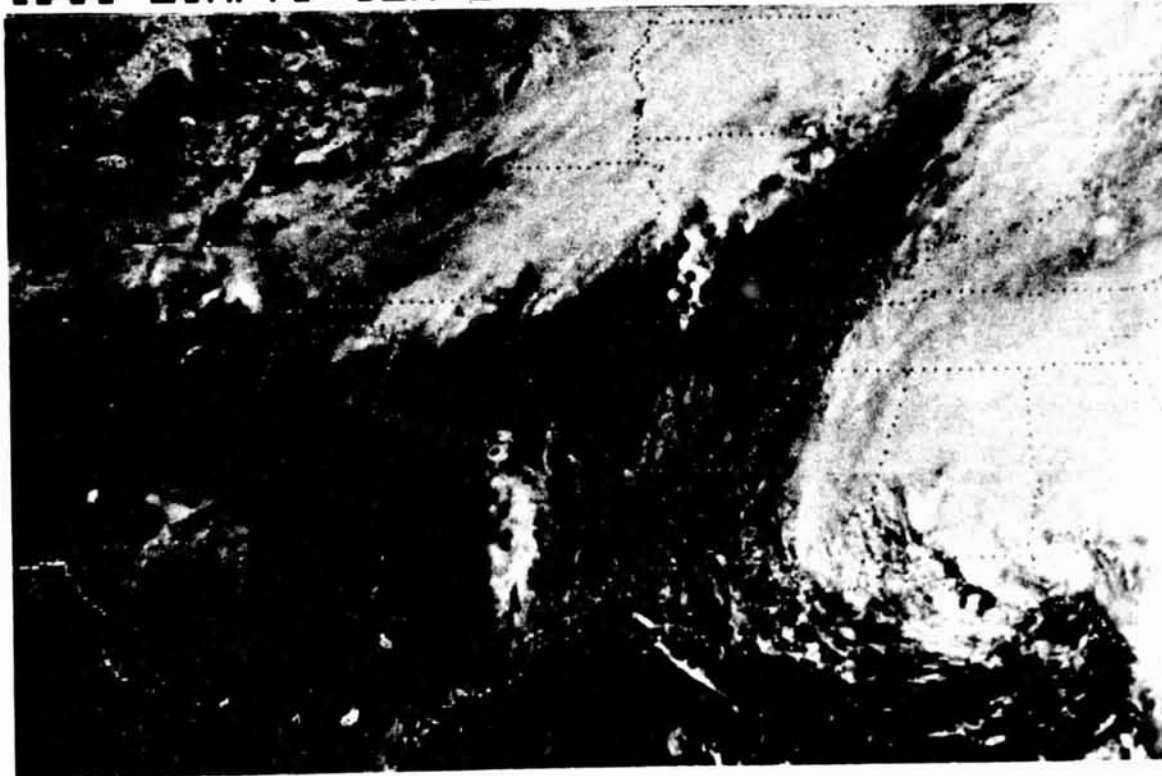


Fig. 27. GOES-East visual satellite imagery for 1901 GMT
25 April 1979.

2001 25AP79 12A-2 01533 13932 P034N93W

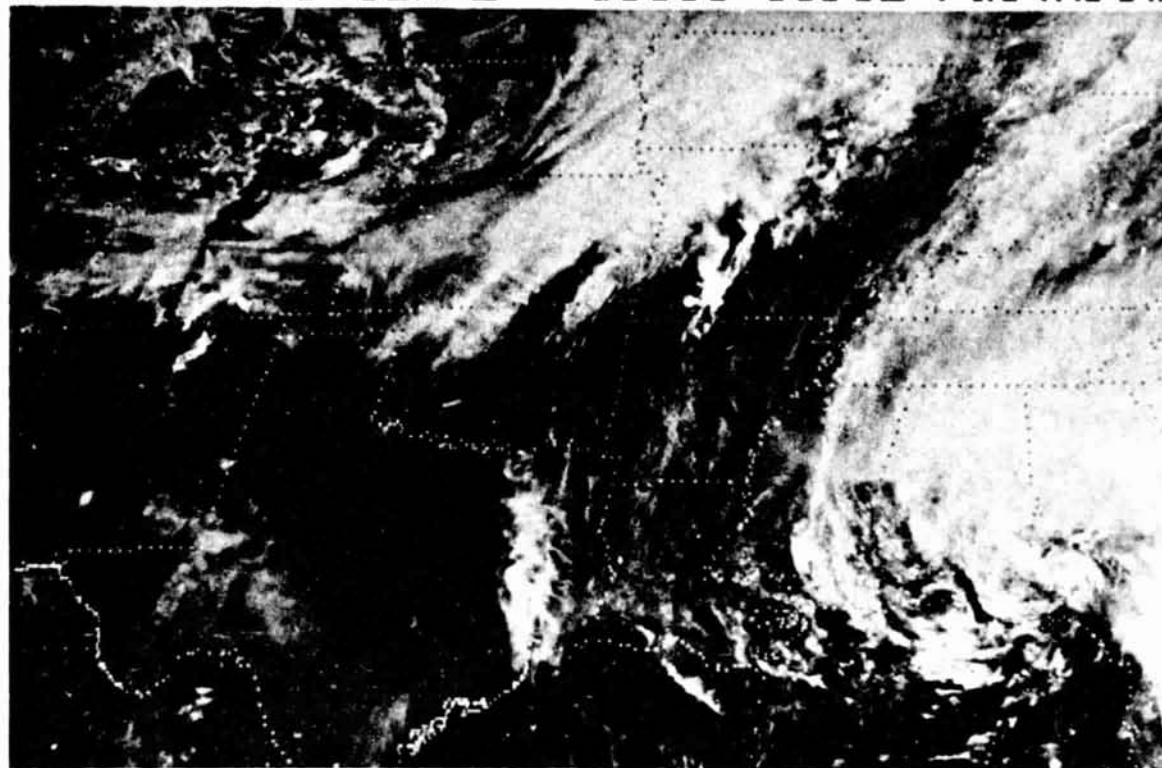


Fig. 28. GOES-East visual satellite imagery for 2001 GMT
25 April 1979.

2046 25AP79 12A-2 01534 14201 P034N92W

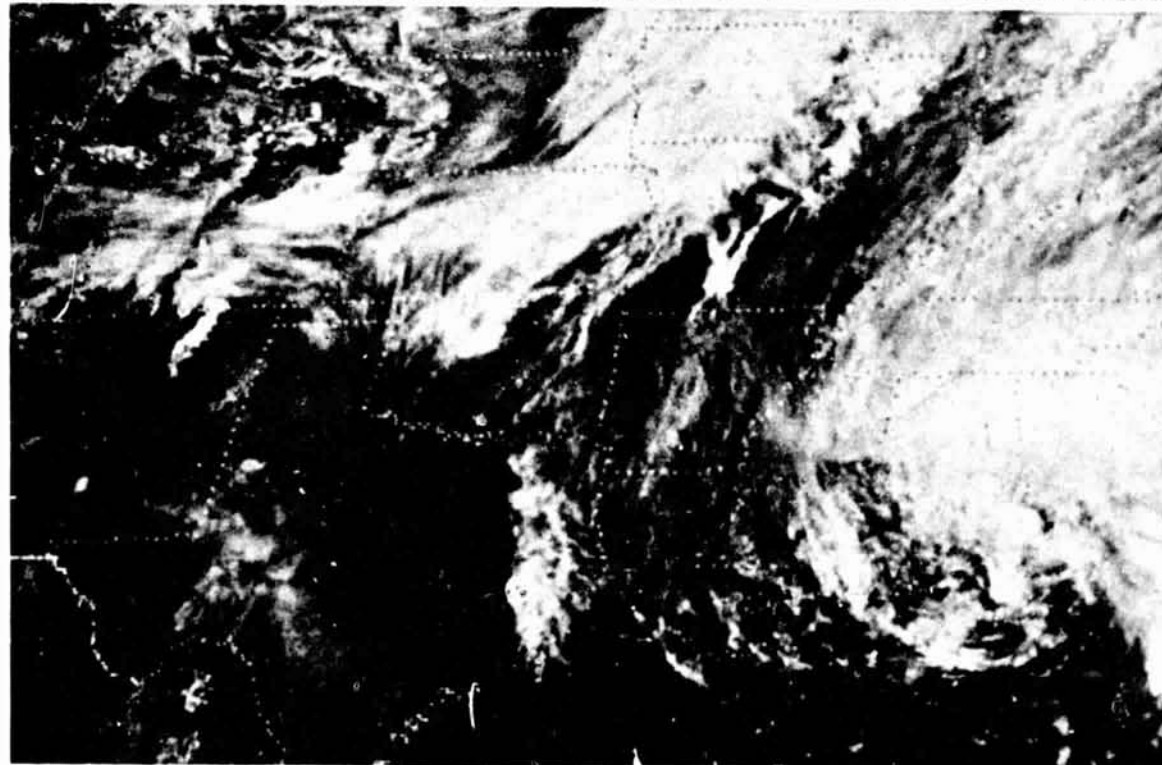


Fig. 29. GOES-East visual satellite imagery for 2046 GMT
25 April 1979.

2201 25AP79 12A-2 01543 13871 P034N93W

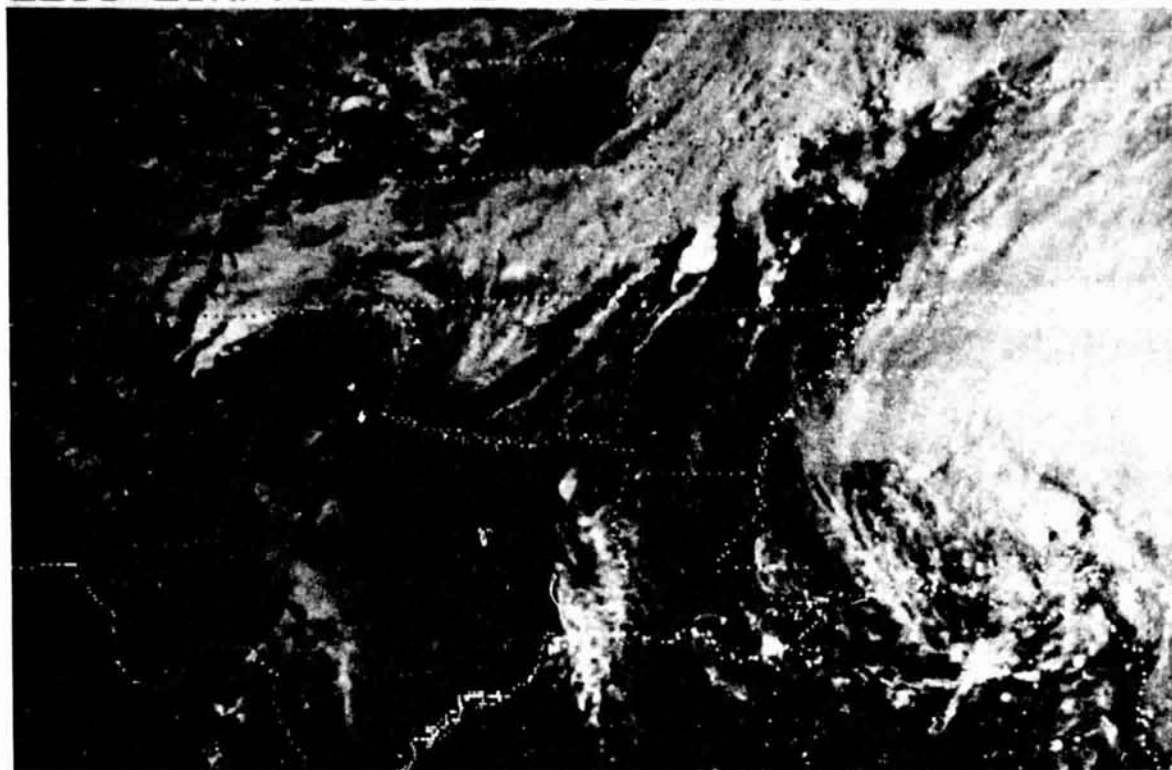


Fig. 30. GOES-East visual satellite imagery for 2201 GMT
25 April 1979.

2315 25AP79 12A-2 01541 14121 P034N92W

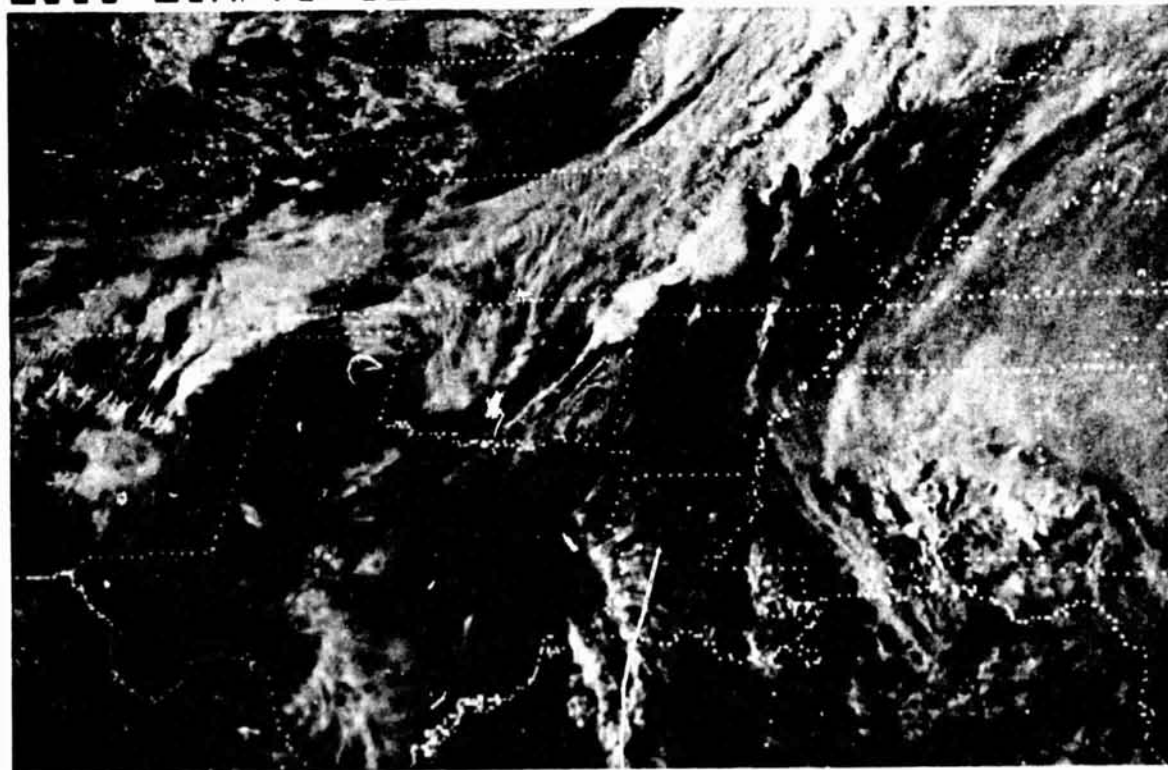


Fig. 31. GOES-East visual satellite imagery for 2315 GMT
25 April 1979.

0001 26AP79 12A-2 01542 13811 P034N93W

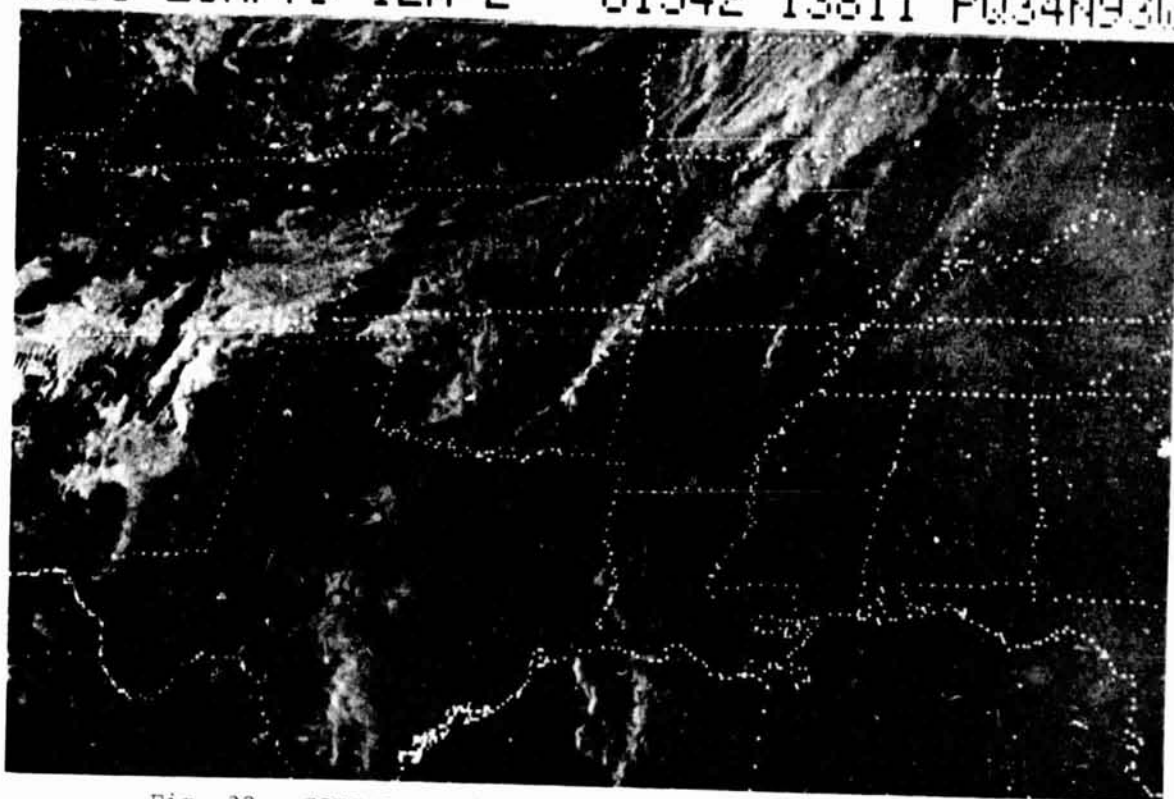


Fig. 32. GOES-East visual satellite imagery for 0001 GMT
26 April 1979.

0101 26AP79 12E-2ZA 01544 13782 P034N93W

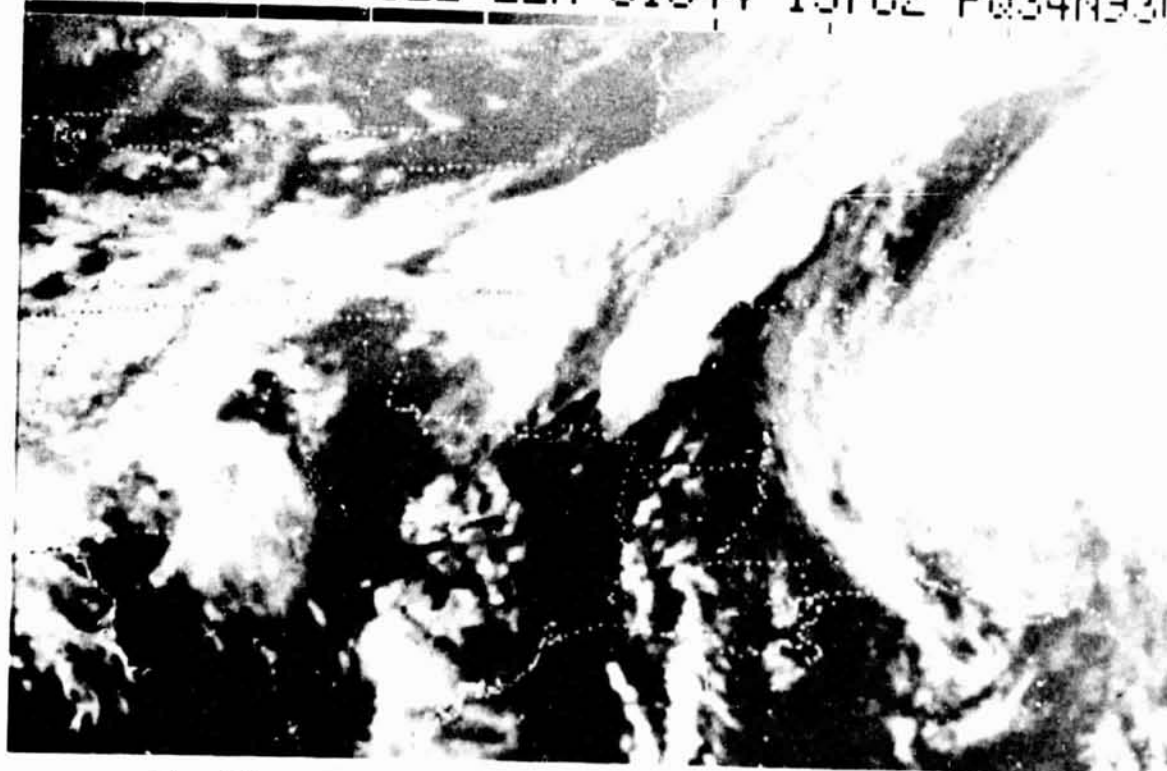


Fig. 33. GOES-East infrared satellite imagery for 0101 GMT
26 April 1979.

0201 26AP79 12E-22A 01542 13771 P034N93W



Fig. 34. GOES-East infrared satellite imagery for 0201 GMT
26 April 1979.

0301 26AP79 12E-22A 01154 13891 P034N93W

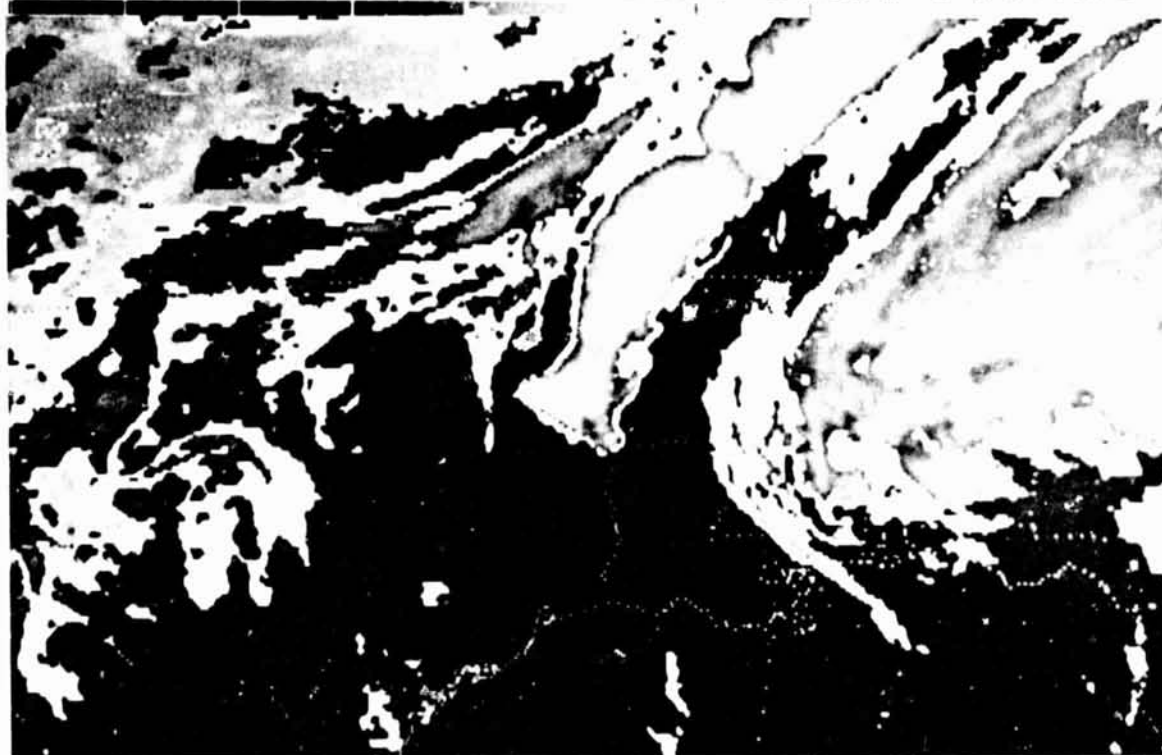


Fig. 35. GOES-East infrared satellite imagery for 0301 GMT
26 April 1979.

0501 26AP79 12E-22A 01552 13761 KB34N93W

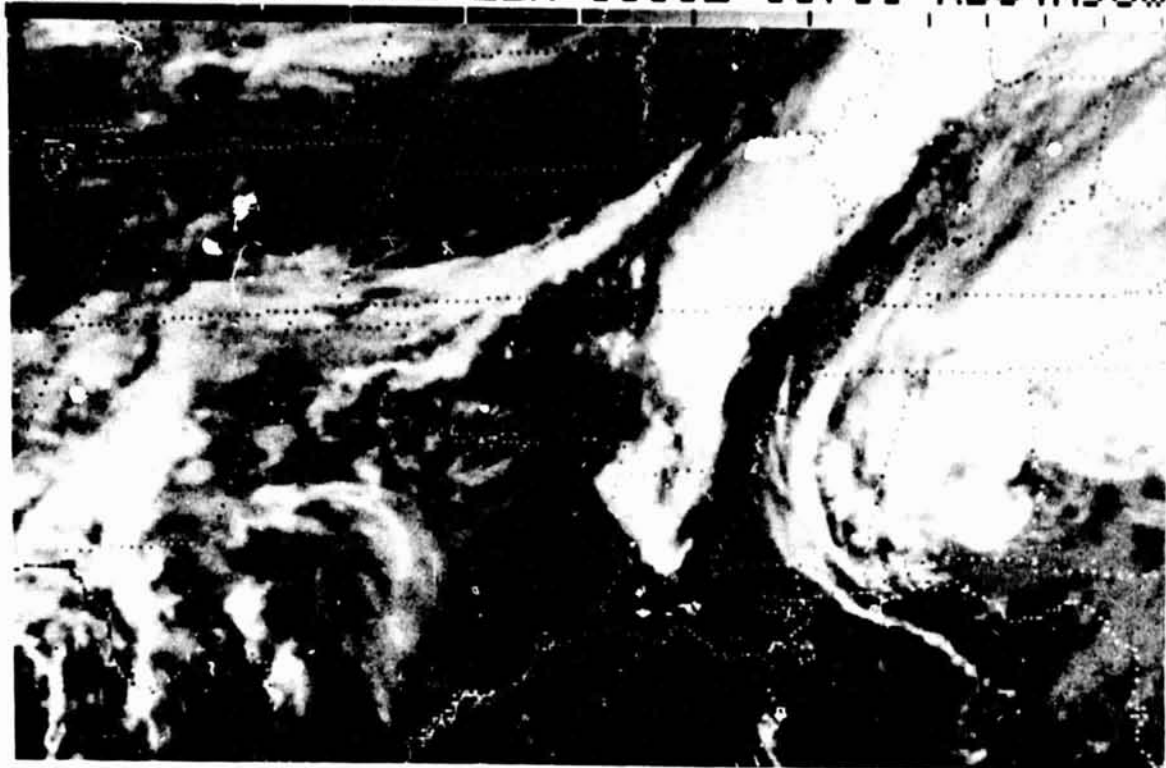


Fig. 36. GOES-East infrared satellite imagery for 0501 GMT
26 April 1979.

0601 26AP79 12E-22A 01542 13781 KB34N93W

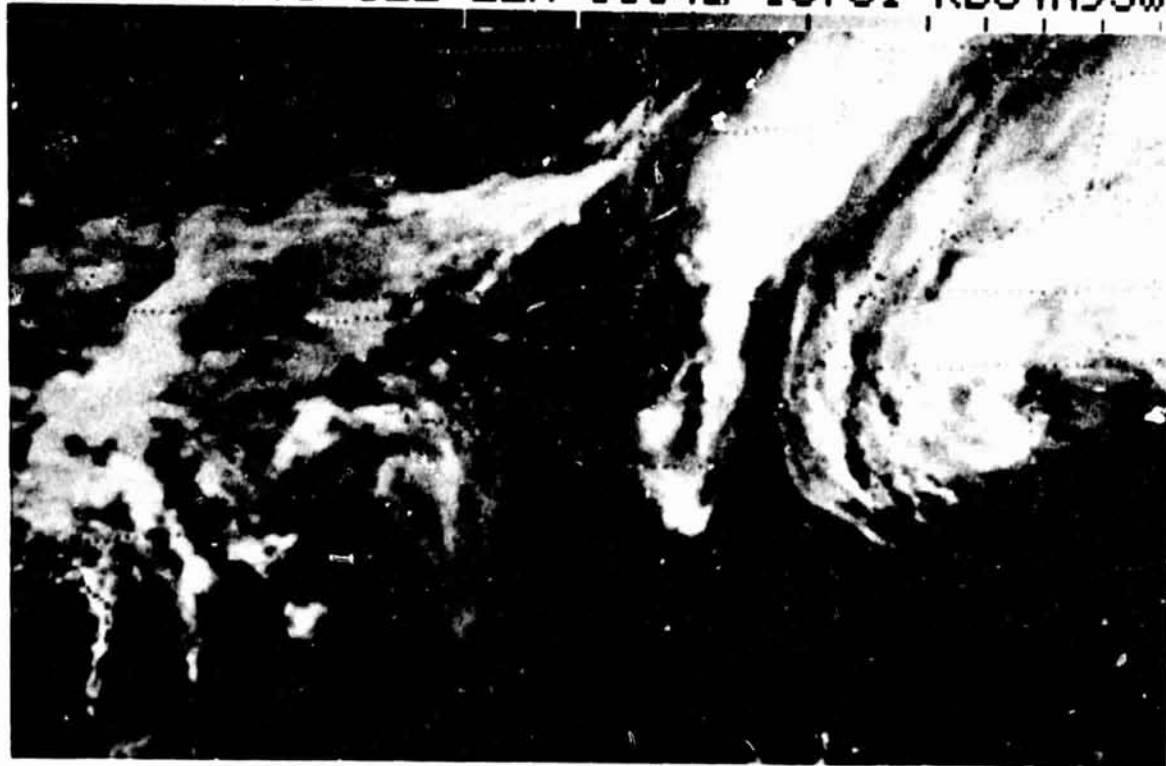


Fig. 37. GOES-East infrared satellite imagery for 0601 GMT
26 April 1979.

0701 26AP79 12E-22A 01534 13801 KB34N93W

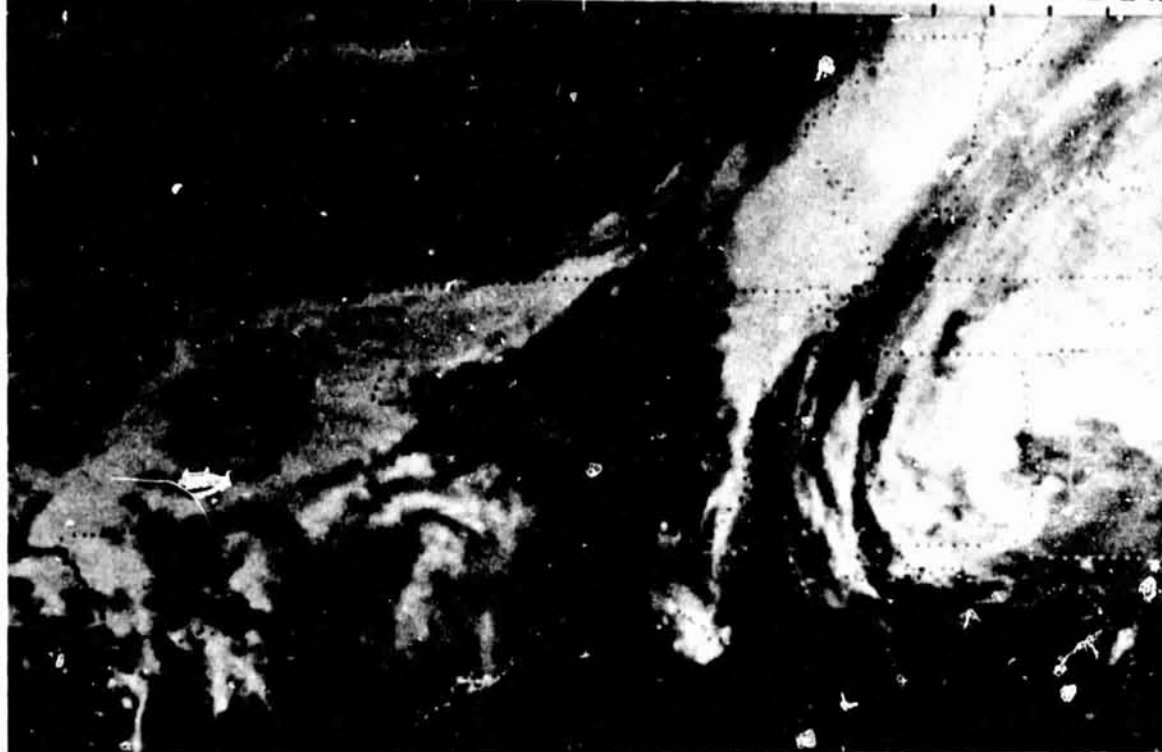


Fig. 38. GOES-East infrared satellite imagery for 0701 GMT
26 April 1979.

0801 26AP79 12E-22A 01542 13831 KB34N93W

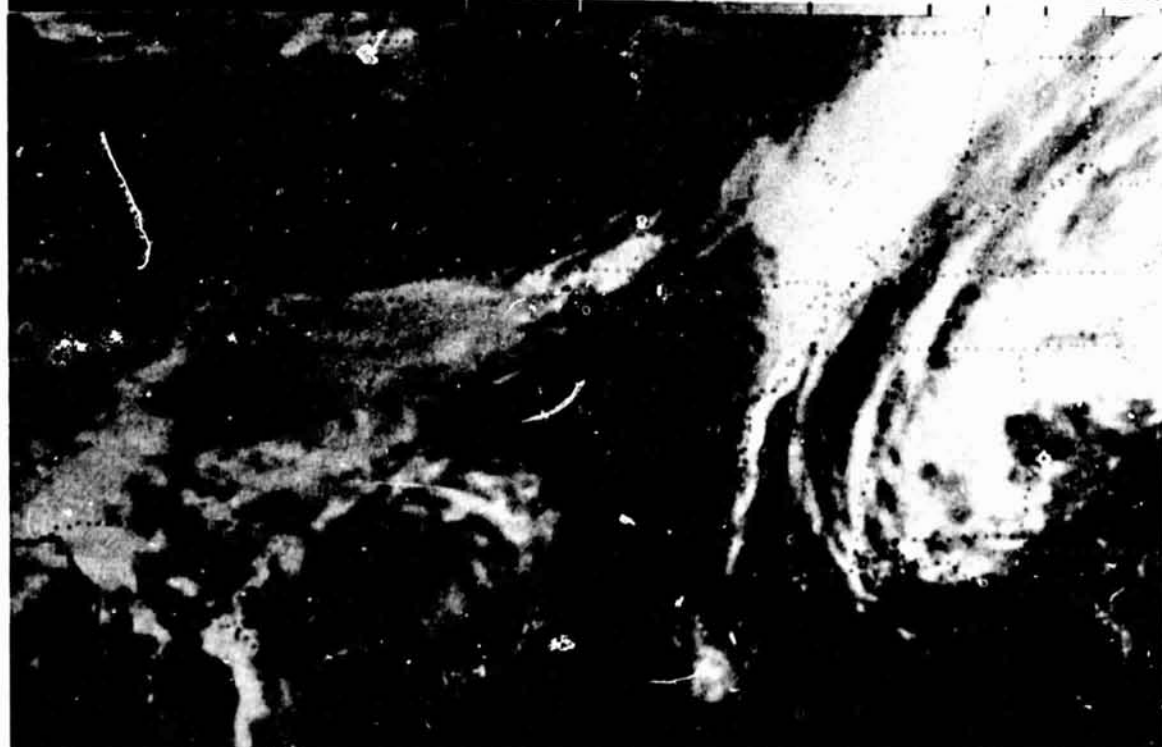


Fig. 39. GOES-East infrared satellite imagery for 0801 GMT
26 April 1979.

0901 26AP79 12E-2ZA 01543 13861 KB34N93W

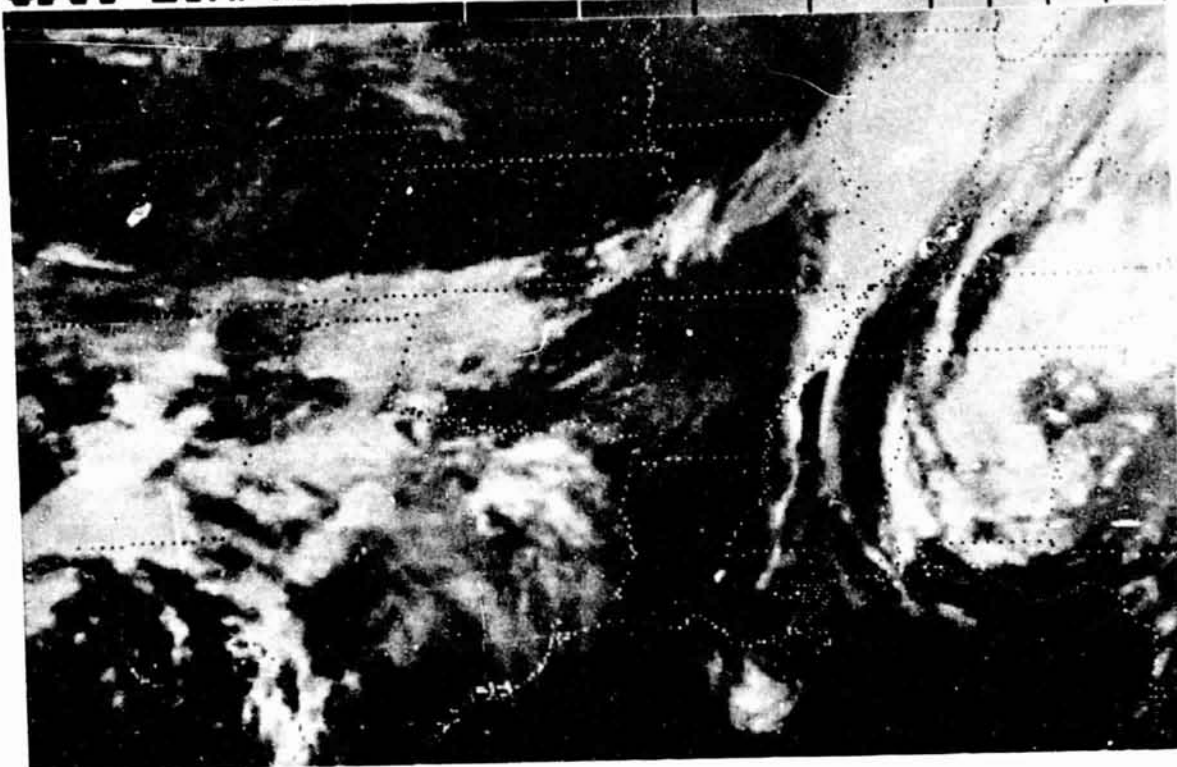


Fig. 40. GOES-East infrared satellite imagery for 0901 GMT
26 April 1979.

1001 26AP79 12E-2ZA 01534 13891 KB34N93W

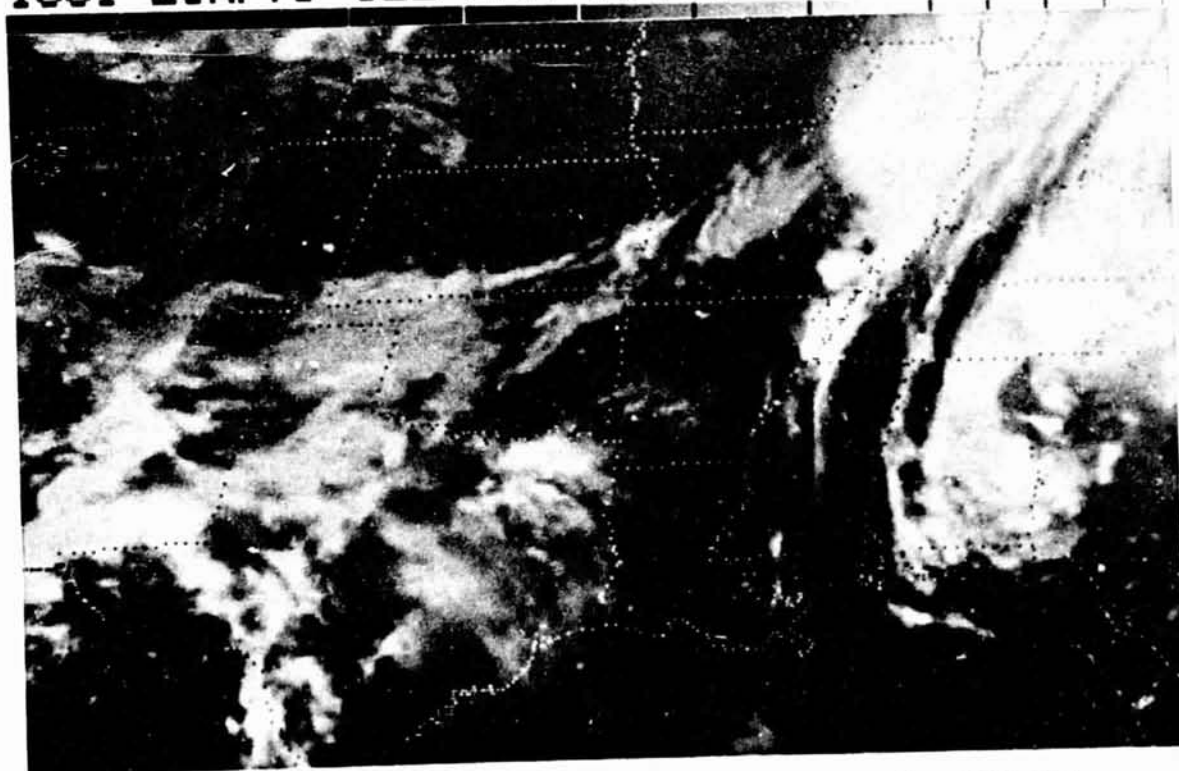


Fig. 41. GOES-East infrared satellite imagery for 1001 GMT
26 April 1979.

1101 26AP79 12E-22A 01534 13921 KB34N93W

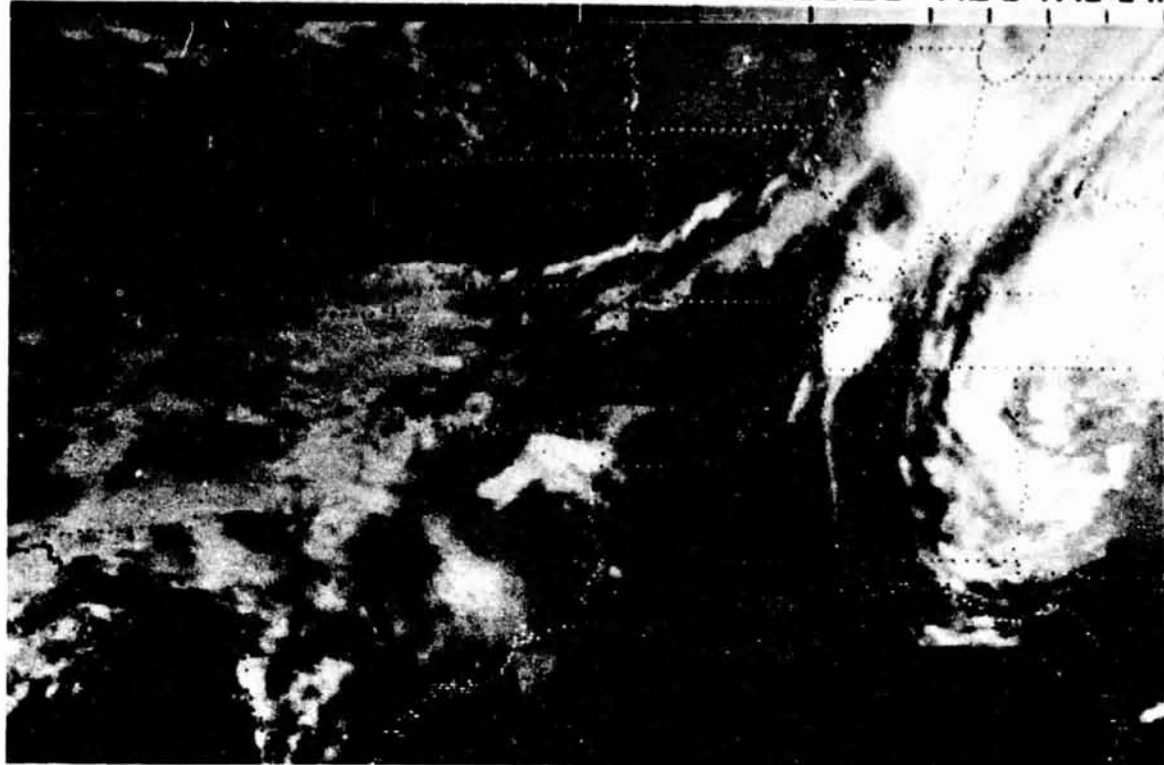


Fig. 42. GOES-East infrared satellite imagery for 1101 GMT
26 April 1979.

1201 26AP79 12E-22A 01541 13942 KB34N93W

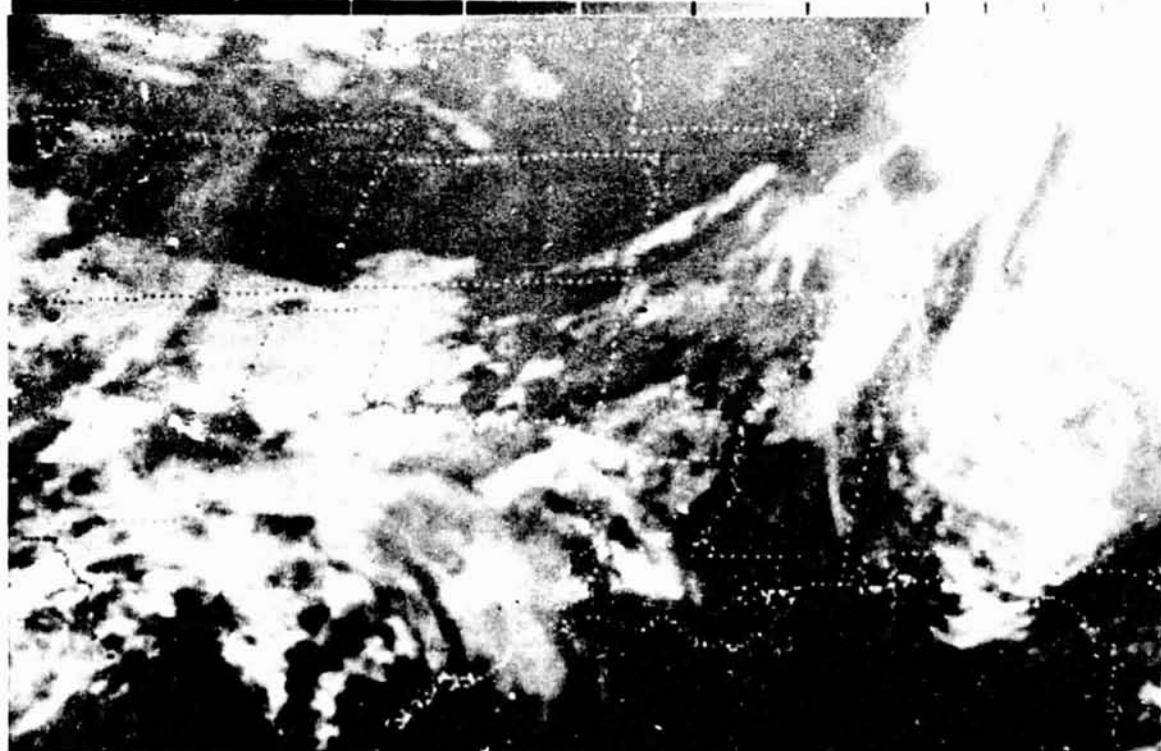


Fig. 43. GOES-East infrared satellite imagery for 1201 GMT
26 April 1979.

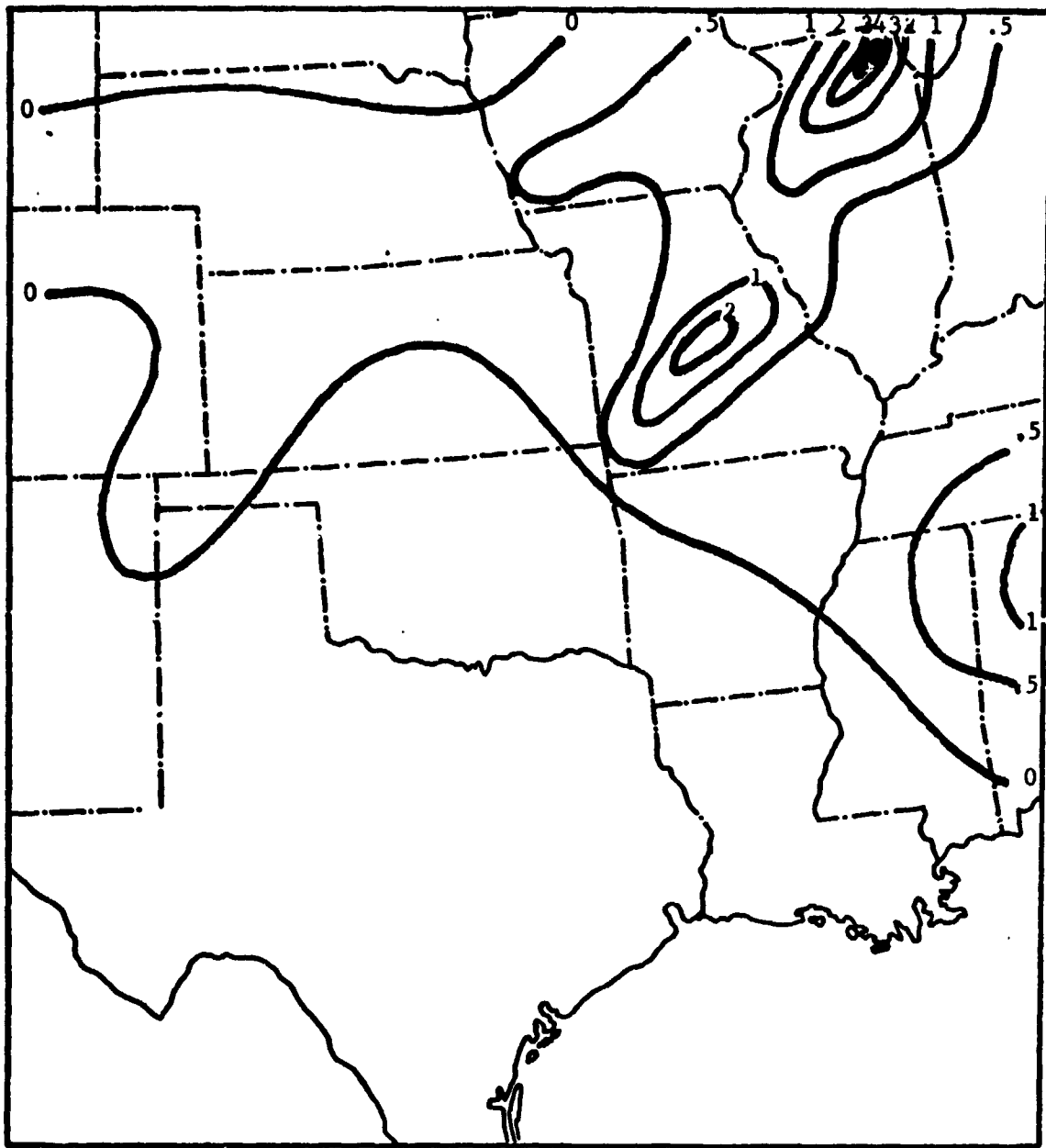


Fig. 44. Total rainfall chart for the period 1200 GMT 25 April to 1200 GMT 26 April 1979 for the central United States.

TABLE 2. Teletype reports taken from NOAA weather wire and national weather summaries of severe and unusual weather from 1200 GMT 25 April to 1200 GMT 26 April 1979.

<u>EVENT</u>	<u>LOCATION</u>	<u>TIME (GMT)</u>
HIGH WINDS	WIND GUSTS OVER 40 MPH AT GARDEN CITY AND GOODLAND IN KANSAS	1213
RAREP GGG	ISOLATED TRWS AND SCATTERED LIGHT RWS OVER N CENTRAL TEXAS	1230
RAREP SEP	WIDELY SCATTERED TRWS AND RWS 25 MI W, S AND E OF GREENVILLE, TX MOVING E AT 25 MPH	1250
CONVECTIVE SIGMET	FROM 30 MI ENE OF SIOUX CITY, IA TO 65 MI NNE OF KANSAS CITY, MO TO 55 MI SW OF GRAND ISLAND, NE TO 20 MI W OF GRAND ISLAND: AREA OF TRWS MOVING FROM 270 AT 20 MPH. MAX TOPS TO 48,000 FT	1255
RIME ICE	AIRCRAFT ENCOUNTERED RIME ICE AT 19,000 FT OVER KANSAS CITY, MO	1330
MOUNTAIN WAVE	MOUNTAIN WAVE ENCOUNTERED BY AIRCRAFT NEAR DENVER, CO	1350
HIGH WINDS	WIND GUSTS OVER 40 MPH AT DODGE CITY, KS AND RUSSELL, KS	1412
RIME ICE	RIME ICE ENCOUNTERED BY AIRCRAFT OVER OMAHA, NE	1425
CONVECTIVE SIGMET	FROM 20 MI SE OF FORT DODGE, IA TO 50 MI SW OF DES MOINES, IA TO 40 MI NW OF KANSAS CITY, MO: A 20 MI WIDE LINE OF TRWS MOVING FROM 280 AT 20 MPH. MAX TOPS TO 40,000 FT	1455
DUST	AIRCRAFT OBSERVED DUST TO 6,000 FT OVER LUBBOCK, TEXAS	1517
HAIL	PEA SIZE HAIL ENCOUNTERED BY AIRCRAFT OVER KANSAS CITY, MO	1530
CONVECTIVE SIGMET	FROM 20 MI NW OF CEDAR RAPIDS, IA TO 30 MI W OF BURLINGTON, IA TO 40 MI SE OF DES MOINES, IA: AREA OF TRWS MOVING FROM 280 AT 30 MPH. MAX TOPS TO 45,000 FT	1655
DUST	DUST ENCOUNTERED BY AIRCRAFT UP TO 600 FT OVER GUTHRIE, TX	1727
LENTICULAR CLOUDS	LENTICULAR CLOUDS SE AND SW OF ALAMOSA, CO	1818

TABLE 2. CONTINUED.

<u>EVENT</u>	<u>LOCATION</u>	<u>TIME (GMT)</u>
RAREP GGG	SCATTERED TRWS DEVELOPED OVER SE TEXAS IN AN AREA 15 MI WIDE FROM SAM RAYBURN RESERVOIR TO VATAW, TX	1830
CONVECTIVE SIGMET	FROM 50 MI ENE OF KANSAS CITY, MO TO 20 MI SW OF COLUMBIA, MO TO 30 MI NW OF SPRINGFIELD, MO: A LINE OF TRWS 20 MI WIDE MOVING FROM 280 AT 35 MPH. MAX TOPS TO 45,000 FT	1855
TURBULENCE	SVR TURBULENCE ENCOUNTERED BY AIRCRAFT OVER MCALESTER, OK	1935
DUST	AIRCRAFT ENCOUNTERED DUST OVER SAN ANGELO, TX	2035
RIME ICE	AIRCRAFT ENCOUNTERED RIME ICE AT 14,000 FT OVER DENVER, CO	2038
CONVECTIVE SIGMET	FROM 50 MI SW OF CHICAGO, IL TO 20 MI E OF ST LOUIS, MO TO 50 MI SE OF COLUMBIA, MO TO 40 MI NE OF BURLINGTON, IA: AREA OF TRWS MOVING FROM 270 AT 30 MPH. MAX TOPS TO 40,000 FT	2055
CONVECTIVE SIGMET	FROM 60 MI SE MARQUETTE, MI TO 50 MI SW OF GREEN BAY, WI TO 70 MI E OF EAU CLAIRE, WI TO 40 MI SW OF MARQUETTE, MI: AREA OF TRWS MOVING FROM 220 AT 25 MPH. MAX TOPS TO 25,000 FT	2055
CONVECTIVE SIGMET	ISOLATED LEVEL 4 TRW 40 MI NW DES MOINES, IA MOVING FROM 270 AT 30 MPH. MAY TOPS TO 35,000 FT	2055
CONVECTIVE SIGMET	ISOLATED LEVEL 5 TRW 20 MI S OF BRADFORD, IL MOVING FROM 270 AT 30 MPH. MAX TOPS TO 40,000 FT	2155
CONVECTIVE SIGMET	ISOLATED LEVEL 5 TRW 50 MI SSE OF MARQUETTE, MI MOVING FROM 220 AT 25 MPH. MAX TOPS TO 30,000 FT	2155
CONVECTIVE SIGMET	ISOLATED LEVEL 3 TRW IN VICINITY OF FORT DODGE, IA MOVING FROM 270 AT 30 MPH. MAX TOPS TO 35,000 FT	2155
CONVECTIVE SIGMET	FROM 50 MI SE OF KANSAS CITY, MO TO 50 MI SW OF SPRINGFIELD, MO: A LINE OF TRWS 15 MI WIDE MOVING FROM 270 AT 20 MPH. MAX TOPS TO 45,000 FT	2155
ICE	AIRCRAFT EXPERIENCED ICING CONDITIONS OVER OMAHA, NE	2220

TABLE 2. CONCLUDED.

<u>EVENT</u>	<u>LOCATION</u>	<u>TIME (GMT)</u>
CONVECTIVE SIGMET	FROM 60 MI E OF MASON CITY, IA TO 45 MI SSE OF DES MOINES, IA TO 20 MI SE OF OMAHA, NE: AREA OF TRWS MOVING FROM 250 AT 30 MPH. MAX TOPS TO 37,000 FT	2355
CONVECTIVE SIGMET	FROM 30 MI W OF BRADFORD, IL TO 50 MI NW OF ST. LOUIS, MO TO 40 MI W OF SPRINGFIELD, MO TO 50 MI NW OF FORT SMITH, AR: A 20 MI WIDE LINE OF TRWS MOVING FROM 270 AT 25 MPH. MAX TOPS TO 52,000 FT	2355
CONVECTIVE SIGMET	FROM BRADFORD, IL TO 60 MI S OF BRADFORD TO 30 MI SW OF COLUMBIA, MO TO 30 MI E OF MCALESTER, OK: A 20 MI WIDE LINE OF TRWS MOVING FROM 270 AT 25 MPH. MAX TOPS TO 55,000. 3/4 INCH HAIL OBSERVED	0055
TURBULENCE	AIRCRAFT EXPERIENCED SVR TURBULENCE OVER DALLAS, TEXAS	0221
CONVECTIVE SIGMET	FROM 50 MI N OF CHICAGO, IL TO 30 MI NW OF DECATUR, IL TO 20 MI NW OF FORT SMITH, AR TO 20 MI SW OF KIRKSVILLE, MO: AREA OF TRWS MOVING FROM 270 AT 25 MPH. MAX TOPS TO 52,000 FT	0255
WIND SHEAR	VIOLENT WIND SHEAR EXPERIENCED BY AIRCRAFT OVER DALLAS, TX	0310
CONVECTIVE SIGMET	FROM 30 MI W OF ALPENA, MI TO 50 MI NE OF FARMINGTON, MO TO 60 MI ENE OF FORT SMITH, AR TO SPRINGFIELD, MO TO 50 MI SW OF GREEN BAY, WI: AREA OF TRWS MOVING FROM 280 AT 15 MPH. MAX TOPS TO 40,000 FT	0555
RAREP SEP	ISOLATED TRW 25 MI E OF WICHITA FALLS, TX MOVING E AT 30 MPH	1050
RAREP GGG	SCATTERED LIGHT RWS DEVELOPED OVER NE TEXAS FROM LAKE OF THE PINES TO NE OF LONGVIEW	1130
RAREP SEP	ISOLATED RW LOCATED 10 MI NW OF SEYMOUR, TX MOVING E AT 35 MPH	1150

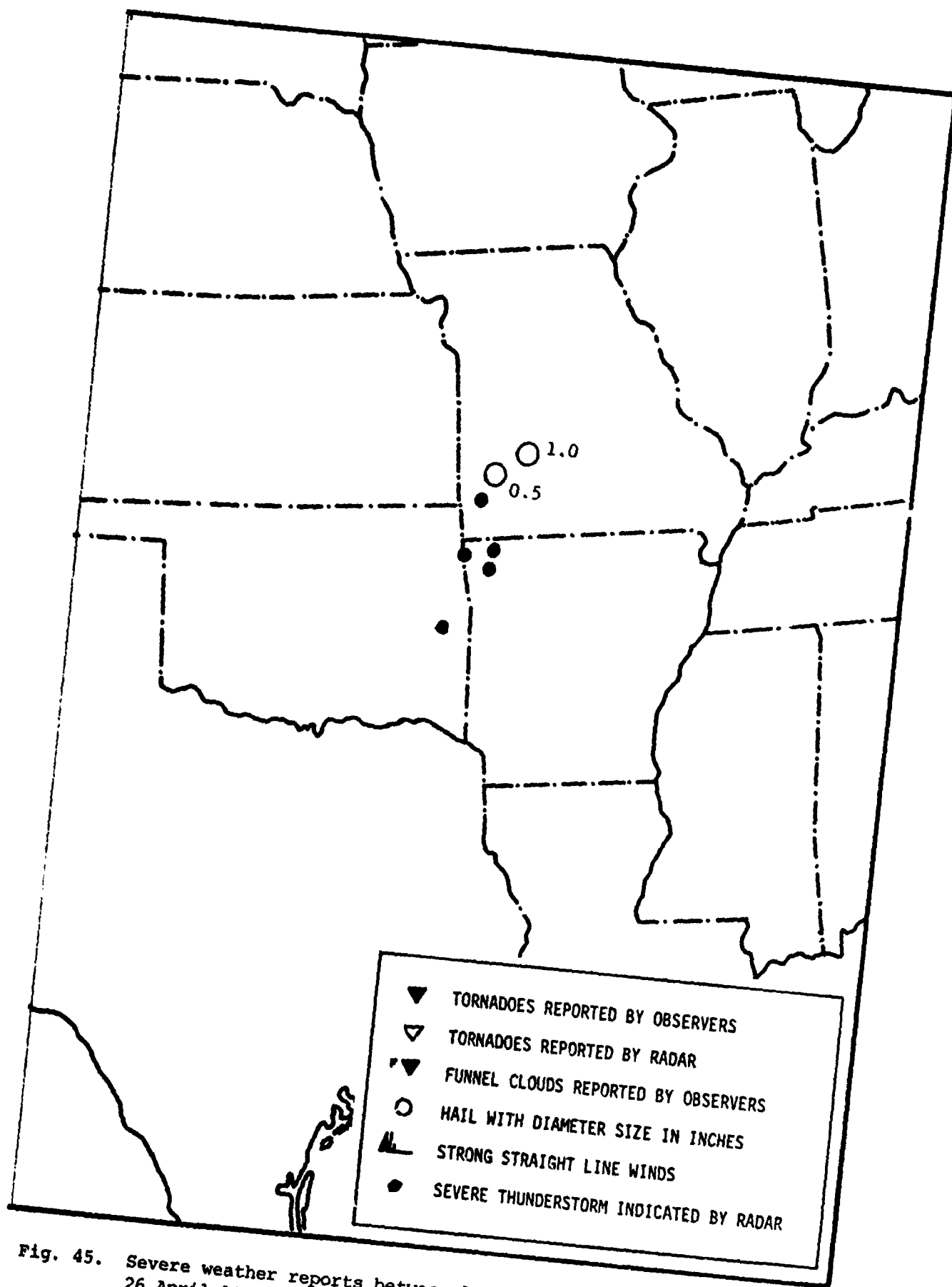


Fig. 45. Severe weather reports between 1200 GMT 25 April and 1200 GMT 26 April 1979 for the Central United States.

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APPROVAL

A PRELIMINARY LOOK AT AVE-SESAME III CONDUCTED
ON 25-26 April 1979

By Steven F. Williams, Nicholas Horvath, and Robert E. Turner

The information in this report has been reviewed for technical content. Review of any information concerning Department of Defense or nuclear energy activities or programs has been made by the MSFC Security Classification Officer. This report, in its entirety, has been determined to be unclassified.

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